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DERIVING AN ECONOMIC INDEX FOR AREAS IN CITIES*

DOUGLAS E. SCATES
Department of Education
Duke University, Durham, N. C.

Editor's note: The author presents an administrative study illustrative of statistical technique useful in this area. Footnotes and references are provided for those who wish to pursue the technical aspects of the subject further.

AN ECONOMIC index for census tracts[1] or other small areas within a city is useful for many purposes. It may be employed in analyses of educational, sociological and economic conditions and consequences. Probably income—per family, or per individual—would furnish the best economic index for general use, but information on incomes is seldom available. Likewise, many of the data which are available for larger territorial units, such as department store sales, automobile purchases, etc., do not apply to the study of small untis such as census tracts. The choice of basic factors is therefore limited.

The present report grows out of attempts to produce an economic index of census tracts in Cincinnati, Ohio, based upon rents paid and the values of owner-occupied homes. There is no presumption that these are the only traits which could be used; nor is there necessarily the assumption that they are the best ones. They are however frequently available.[2] We are here con-

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[1] Eighteen cities had census tracts in 1930 and forty-four more cities have prepared census tracts to be used in the 1940 census. For a definition of census tracts and list of cities having them, see: U. S. Department of Commerce, Bureau of the Census, "Census Tracts in American Cities," by Howard Whipple Green and Leon E. Truesdell. Revised edition, July 1937, 8 p. The procedure described in the present article is not limited to census tracts but is applicable to any areas for which data are available. See footnote 2.

[2] Data for frequency distributions of rent and home values in 1930 will be found in the fifteenth census, principally in the volume *Population, Vol. VI, Families.*

cerned with three methods of combining these two traits to form a single index, and with a comparison of the results of the different methods. The methods will be referred to as: (1) the one per cent method, (2) the empirical curve method, and (3) the estimated income method. Each postulates a somewhat different structure of relationship between the two traits (rent paid, and value of owner-occupied homes).

THE ONE PERCENT METHOD

The one per cent method involves a direct compounding of the two types of data after assuming that monthly rent paid is the equivalent of one per cent of the value of the property. This is a somewhat commonly used ratio. The writer conferred with local real estate people, the Chamber of Commerce, a college professor of real estate, several government offices, and a number of specialists interested in census tract analysis. The conclusion was that one per cent a month, or twelve per cent a year, was theoretically a little low for rent—after allowance is made for interest on investment, taxes, maintenance, depreciation, insurance, and vacancy. Practically, the per cent might be somewhat high during the depression, and it was frequently not possible to realize this income on single-family dwellings. Some workers thought that it was a reasonable ratio to use, others thought that it was unsatisfactory. Inasmuch as the census returns on income and home value are presented in intervals which imply this relationship, it was tried as a starting point.[3]

Two variations of this one per cent method were used. The first attack might be outlined as consisting of the following four steps: (1) calculating an average (mean) of the monthly rent paid, for each of the 107 census tracts in the city; (2) calculating an average of the value of the owner-occupied homes in each census tract; (3) translating the average home value into an equivalent average monthly rent by taking one per cent

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Distributions for entire cities are in Tables 67, 68, and 79, covering cities above 10,000. Distributions for small areas in cities (approximating wards) are given for each city over 100,000 in Table 24 under the various states. Census tracts are smaller than wards, usually running from one-third to one-sixth the size of a ward, and afford a more detailed analysis of the city. Cities which have census tracts (see footnote 1) may obtain distributions by census tract upon paying the cost of the special tabulation. Sometimes local surveys or censuses are made which afford the desired information, perhaps for intercensal years.

[3] The data of the present study indicate that a relationship of one-half of one percent a month, or six percent a year, would be more suitable for equating purposes (see footnote 12).

of it; and (4) calculating a weighted average of these two averages for each tract, using as the weights the number of families that rented and the number that were living in their own homes. This would give a figure representing an equivalent average monthly rent for each census tract. In actual practice the work could be shortcut some. Inasmuch as the census reported frequency distributions of the two traits (for each census tract)[4] in class intervals which had a relationship of one per cent (for example, $20–$30 for rent, and $2,000–$3,000 for home values), the desired results for each tract could be obtained in a single process by using a working origin in one series that was one per cent of that in the other, and cumulating deviations from these origins to a total for the two distributions, just as one would ordinarily do for a single distribution. The compound weighted mean resulted directly, without the necessity of calculating two separate means for each tract and then averaging them.

The other variation of this one per cent method was to employ a weighted average of medians for each tract—instead of the average of means. While theoretically an average of medians has no sanction, practically it may be found satisfactory. The median has these two advantages: (1) it can be calculated more rapidly, and probably with less likelihood of large error. Where several hundred calculations of the same type are involved, this may be a matter of concern. (2) The terminal intervals at each end of the distribution of census data are indefinite; that is, they do not have any specified outer limit. To calculate a mean of the distribution calls for a careful evaluation of these indefinite intervals, and the determination of a reasonable midpoint or mean for them. The use of the median avoids this necessity. Accordingly, medians were calculated for the rents, and for the value of owner-occupied homes, in each census tract. These two medians for each tract were then weighted by their respective number of families and averaged[5] giving something[6] in the form of a median equivalent

[4] Data for the census tracts of Cincinnati were taken from Table 10, "Homes by Tenure and Value or Monthly Rental for Census Tracts: 1930," in a volume of special census tract tabulations of Cincinnati, prepared by the United States Bureau of the Census, and on file in the Department of Sociology, University of Cincinnati.

[5] This method had been used previously by a student at the University of Cincinnati. Philip W. Scott, "Statistical Quota Formulations for the Hamilton County Community Chest, 1933." ms. April 10, 1933. Thesis for Commercial Engineering Degree, Engineering College, in the present study independent calculations were made.

[6] Strictly, it is not to be assumed that this average of medians is the same as the median of a combined frequency distribution—though it probably would correlate highly with the latter. To obtain a true median, one would combine directly the

given for only four cities—Cleveland, Ohio; Richmond, Virginia; Atlanta, Georgia; and Birmingham, Alabama. In these cities however there were figures for nearly 80,000 reports; and the fact that three of the cities represented southern areas was offset by the fact that the population from Cleveland constituted more than half of the total for the four cities.[9] Negro families were included in all cases after an examination failed to reveal any difference in relationships for them; they had a weighting of 6% in the data used.

Using data on the average rent and average value of owner-occupied dwellings, for each income group, a curve of relationship was constructed. For this purpose a least-squares third-degree (cubic) curve was selected[10] in order to allow for possible curvature in the relationship. The curve was not markedly different from a straight line, however, and for practical purposes the latter would suffice.[11] From the equation of the curve[12] home

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merely to relate the averages in the two tables. Ideally, the basic data would have been presented in a table having value of property as the argument with income as the dependent variable; then a second basic table showing income in the argument and rent as the dependent variable. From such tables better data could have been obtained for establishing the desired relationship. But basic data had to be used as presented. Because of the way the basic data were arranged, there were few cases of high average home value, largely because of wide income intervals. Accordingly, the fitted curve of relationship was unreliable in the upper ranges.

[9] The trend for Cleveland was somewhat distinct from the trend for the other three cities, giving home values about $1,500 higher for a given rent and income, in the middle range; or, giving annual rents about $100 lower, for a given home value and income, in the middle range. Apparently however the combination of the trends for Cleveland and for the other three cities afforded a fair approximation to the average relationship in a larger number of cities. This is suggested by the agreement of the results with the third method, described later.

[10] In constructing the scatter diagram for the curve, a "case" was two groups of persons (renters and owners) falling in a single income interval in a given city, one group having an average rent and the other having an average home value. A problem of weighting arose, since, for each such "case" the number of renters was different from the number of owner-occupants, and each case in the scatter diagram therefore had two different weightings. After some exploration it was decided to weight each case by the smaller number (renters or owners), thus weighting according to its minimum dependability.

[11] Between the limits of $2,000 and $8,000 home value the cubic is almost identical with a least-squares straight line. At $11,000 the two differ by $50 annual rent. If a straight line is used it will give better results when fitted to observations below $11,000. See the next note.

[12] It was necessary to make an adjustment in the upper portion of the cubic because it turns down within the range of observation when it should continue upward. The difficulty arises from the fact that there are only one-sixtieth of the cases in the range above $11,000, whereas two-thirds of the curve lies above this

values in Cincinnati were translated into rent figures. This translation was accompanied by finding, for the midpoint of each interval of the distribution of home values, the corresponding rental given by the curve. This rent figure was then substituted for the original midpoint value of each interval in the home value distribution, and the average calculated in the ordinary way. Since the scales of the two distributions were now the same, it was possible to calculate a weighted average of the two traits combined, for each census tract, in a single operation, just as was done in the first method. An average equivalent rent figure was thus obtained for each census tract.

This method of combining the two traits, rent and home value, has few logical objections and has a good deal in its favor. It does not yield directly an estimate of income, but it does tend to combine the two traits in such a way as to give the same relative index values for the census tracts as they would have on the basis of family income. This point is borne out by agreement with the third method, next to be described. The index which was produced by this second method correlated .95 with both variations of the one per cent method previously described. This correlation indicates that, though we may prefer the method based upon the empirically derived relationship, the one per cent method will give reasonably satisfactory results.[13] The equations which are given in the present paper (footnote 12) however are as applicable to other cities as to Cincinnati, and they

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point. The plotted curve is reasonable up to about $18,000, beyond which a freehand extension was used terminating with the value given by a fitted straight line.

The equation for the cubic is: $Y = 558 + 67.4X + 0.43X^2 - 0.1363X^3$ where Y is the equivalent rent, and X is the value of homes less $9,500, and the difference divided by $1,000 (to afford a convenient working origin and scale). For values of X above 8 the curve was arbitrarily raised.

The equation for a straight line fitted to all the data is: $Y = 525 + 53.8X$; for a line fitted to the observations below $11,000 the equation is: $Y = 543 + 57.9X$. The X scale is the same as for the cubic.

[13] For practical purposes the first method would give the same results as the second if a ratio of one-half percent a month were used in place of the 1 percent. This one-half percent ratio holds almost exactly for the range of home values from $5,000 to $15,000—about two-thirds of all homes. This ratio has no implication as to the actual return from rented property; it simply indicates that people who are renting, would, if they purchased, buy a house valued at two hundred times their monthly rental (seventeen times their annual rental) and that families who own homes would, if they became renters, pay only one-half percent a month of the value of their former home. The fact that this is roughly half what would be necessary to afford a satisfactory return on property investments probably means that people are not willing to spend as large a portion of their income for renting as they are for purchasing and owning a home. Also, in 1933–34 when these data were gathered in various cities the rental rates may have fallen more than the values of homes had.

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monthly rent for each tract. Interestingly enough, the series of means for the census tracts of the city, and the series of averaged medians, correlated .98. This close relationship argues nothing as to the validity of either method, but does indicate that if one wishes to employ the one per cent method, he will obtain practically the same results by averaging medians as by averaging means, and may do so more rapidly.

Both of the procedures just described depended upon a fixed and somewhat arbitrary relationship. If this ratio were wrong, it would affect the indexes of the census tracts in different ways, depending upon the varying proportions of renters in the tracts. If it were a correct ratio, it might still be correct on the average only, and not be satisfactory for different parts of the distribution. That is, the true relationship might not be constant across the scale—and might not even be linear. In this case the use of a constant ratio would produce freakish results under the influence of varying shapes of distribution, or proportions of cases in the different intervals. Accordingly some more flexible and empirically determined relationship was sought. Two methods of establishing this relationship were evolved, and their application is reported below as comprising the second and third principal methods tried.

EMPIRICAL CURVE METHOD

The second method of combining the data depended upon establishing an empirical curve of relationship between rent and home values. This relationship had to be based upon certain assumptions, the chief one being that, for present purposes, rent and home values were equivalent when people of the same income group rent or own homes having these values. That is, if families having an income of $1,500 pay an average annual rent of $300 and other families having this same income own homes having an average value of $5,500, then $300 rent is considered equivalent to a $5,500 home value. This procedure means that the particular values of the two traits which are combined represent families having the same income. In other words, both of these values represent the same economic class, which is exactly the basis we desire for combining them to produce an economic index.

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frequencies of the two traits, making a single frequency distribution for each census tract. From this the median could be calculated. This method was not tried in the present study, as it was longer than either of the one percent methods used, and seemed to have no advantages.

By way of further explanation we might point out that this basis of equivalence makes no assumption as to the proportion of people who will rent and who will purchase property. Nor does it assume that the 75th percentile of rents is equivalent to the 75th percentile of the home values, or that medians or means of the two distributions are equivalent. It does not involve any assumption with reference to the proportion of income that a family will spend on rent, or on purchasing a home, nor that they will rent as good a home as they would purchase. It implies nothing whatever with reference to the amount of rent that would constitute a fair return on property of a given value. The approach is not from the standpoint of the owner seeking a financial return on his investment, but from the standpoint of the family with a given income seeking a dwelling. If the family chooses to rent, they are willing to pay X dollars; if they decide to buy, they are willing to pay Y dollars. For our purpose we desire to know, for each income level, what values of X and Y are equally acceptable—equal, not as indicated by the same number choosing to rent and to purchase, because many extraneous factors enter in to affect such a decision; but equal as indicated by what they do pay when they choose. Such an equivalence enables us to combine the X and Y values as indicators of the same economic status.

Fortunately data which were essential for carrying out this method were available from the national *Financial Survey of Urban Housing*, prepared in the Bureau of Foreign and Domestic Commerce, and based on data gathered from the field for 1933 and 1934.[7] While the survey included 22 cities, data of the type necessary for the present purpose[8] were

[7] U. S. Department of Commerce, Bureau of Foreign and Domestic Commerce. *Financial Survey of Urban Housing* (Washington, D. C.: Government Printing Office, 1937), 1245 p. "An analysis of the financial and economic data of urban homes in 22 representative cities." Data were gathered as of January 1, 1934, representing annual rents and incomes for the calendar year 1933.

[8] Data on average value of property for various income groups were taken from Table 77, and data on average annual rents for various income groups were taken from Table 78. These tables were given only for the four cities named. It developed subsequently that the data for the white and Negro races could be combined, and hence data from a larger number of cities could have been used, being taken from Tables 18 and 19 for each city. It is doubtful, however, that much improvement would have resulted, as the results of this second method are in close agreement with those of the third method which was based upon 16 cities.

In preparing the scatter diagram for fitting the curve, the average value given in Table 77 was paired with the average rent given in Table 78, for the same income group. The amount of income did not enter into the scatter diagram, but served

given for only four cities—Cleveland, Ohio; Richmond, Virginia; Atlanta, Georgia; and Birmingham, Alabama. In these cities however there were figures for nearly 80,000 reports; and the fact that three of the cities represented southern areas was offset by the fact that the population from Cleveland constituted more than half of the total for the four cities.[9] Negro families were included in all cases after an examination failed to reveal any difference in relationships for them; they had a weighting of 6% in the data used.

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make this second method as direct and short as calculating the weighted means according to the first method.

THE ESTIMATED INCOME METHOD

The third method to be described sought to produce an economic index directly in terms of family income, by estimating for each census tract the average income of the renters, and the average income of the home owners, and then taking a weighted average of these two estimates. For this purpose, the relationship between income and rent, and the relationship between income and home values, were needed. Again, data from the *Financial Survey of Urban Housing* were made use of to establish the necessary relationships.[14] Data from sixteen cities were included in this third method; these represented all of the cities in the Survey between one hundred thousand and five hundred thousand population. The three cities above 500,000 were excluded because analyses revealed that their ratios were markedly different from those for the other cities. Accordingly, Cleveland, which made up more than half of the total number of cases for establishing the relationship, in the second method, was omitted entirely from the relationships established in this third method. On the basis of data from these sixteen cities, two least-squares cubics were calculated—one for estimating income from rent, and the other for estimating income from home values.[15] From these two curves, the values of the mid-points of intervals were translated into income, and the average estimated income was calculated from the two distributions for each census tract, following the manner outlined for the second method.

[14] Data for these purposes are available in Tables 18 and 19, for each city. The data are given in somewhat more convenient form in two summary tables given at the beginning of Section IV, for each city. Two different scatter diagrams were constructed from the two sets of data. As before, data ideal for the purpose, were not available; such data should be arranged with average home value, or average rent, as the argument, and income as a dependent trait. The division of data into income groups (as they were reported) is something of a limitation on the range of values needed to establish the relationship reliably at the extremes.

[15] The equation for the cubic curve to estimate family income from rent is: $Y = 3479 + 559.6X + 15.50X^2 - 0.5346X^3$ where Y is the estimated income, and X is the annual rent less \$525, and the difference divided by 50. To estimate family income from the value of owner-occupied homes, the equation is: $Y = 1669 + 314.4X + 10.18X^2 - 0.1824X^3$ where X is the home value less \$4,500, and the difference divided by 500. The first curve was arbitrarily raised for rents above \$1,700, and the second curve was raised for home values above \$18,000. These modifications affected few cases in the translation of Cincinnati values—six-tenths of one percent in the first case, and seven percent in the second case, so that any error involved in the adjustment would have slight effects.

The result is probably as good an estimate of family income as can be obtained from available data on rent and on home values.[16] It should be pointed out however that for our purpose we are not concerned with whether the figure is a good estimate of income, but only whether it will rank the census tracts in the same order that income would. Inasmuch as there is no independent criterion for determining whether this index actually does what we hope it does, its defense must rest upon the logic of the method by which it was derived. It is however of interest to note that the results of this third method correlate .98 with the results of the second method, for the 107 census tracts of Cincinnati. This close correspondence is somewhat surprising in view of the fact that the curves of relationship were established on data from different cities, and that the two methods involve different mathematical procedures and a somewhat different logic. For all practical purposes, however, they may be regarded as giving the same results,[17] and the choice between the second and third methods will rest on the availability of data, ease of calculation, and whether one wishes an actual estimate of income.

It is difficult to determine the relative effects on the second and third methods of inaccuracies in the census data. We should like to know, for example, which method is less affected by a family's reporting its income $1,000 too high or too low; by their reporting rent too high or too low,

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[16] It should be a very much better estimate than that sometimes obtained by multiplying the average rent paid, by four. While various studies have indicated that families on the average spend about one-fourth of their income for rent (e. g. *Financial Survey of Urban Housing*, the second table in Section IV for each city), this percent varies considerably with different incomes, and so would give biased estimates for distributions which were not typical. Further it would need correcting for the value of owned homes in tracts having few renters. (See last paragraph before conclusions.) The fact that tenants on the whole have lower incomes than do owner-occupants does not affect the relationship found in either the second or third methods; income is held constant in each case, in the second method, and in the third method the two groups have separate equations.

[17] That is, the same so far as correlation is concerned. It will be borne in mind, however, that correlation is independent of averages, standard deviations, and similarity of scales, so that the high correlation does not mean the two series of figures are the same—but only that one can be translated into the other with little discrepancy. This third method correlates with the one percent methods described at first to the extent of .97; since this is somewhat higher than the correlation between the first and second methods (which was .95), this fact might be argued as being against the present method and in favor of the second; but there is not much to be said either way. The difference in correlation might be due entirely to the different cities employed in establishing the basic relationships.

and the same for home values. We are also interested in knowing which method remains the most stable under changing economic conditions: specifically, which method is likely to be the most dependable when the basic data for establishing the relationships are eight years old; when the basic data on distribution of rents and home values are old; when the data for the distributions and the data for the relationships are gathered in different years, in different phases of an economic cycle, etc. Will the social security program have any influence on the stability of these relationships? These and other practical questions must await further exploration and trial by experience. For the present we can only say that the three different methods yielded results closely the same, and the second and third methods were nearly identical.

In closing, attention may be called to the possibility of using rent alone as an economic index. For the Cincinnati tracts average rent (from the 1930 census) correlated .96 with each of the second and third methods (which utilized 1930 data on rent and home values, and 1934 data on relationships). It correlated .92 with both of the one per cent methods. It is notably better than the average value of homes, which yielded a correlation of only .82. While rent thus affords a simple and ready economic index in itself, it is beset with definite dangers—the most outstanding of which center in those areas where there is practically no rented property, or where the owner-occupied dwellings are of high grade and the only rented property is shacks. One must decide in the light of local insight whether it is safe to use rent alone as an index, without the corrective of home values.

CONCLUSIONS

1. If one is employing a fixed ratio for converting values of owner-occupied homes into equivalent rent, it makes little difference whether he uses the more exact method of calculating means, or whether he takes a weighted average of the medians of the two traits for each census tract. Results correlated .98.

2. The fixed ratio methods of combining rent and value of homes are reasonably satisfactory where one is in a hurry—though the calculation of a mean is no shorter than the second and third methods when the relationship constants are already available. The fixed ratio (one per cent) results correlated .95 and .97 with the presumably better indexes. A fixed ratio of one-half per cent would have correlated higher.

3. If one wishes to employ an empirically determined relationship between income, rent, and home values, it makes little difference so far as method is concerned whether he converts home value to rent, or converts both into income and then combines. Results, based in each case on least-squares third degree curves of equivalence, correlated .98. The choice would lie with various external considerations.

4. Average rent appears to be a fairly satisfactory economic index by itself; it correlated .96 with the indexes just referred to, and .92 with the indexes based on a fixed ratio equivalence. It has, however, definite dangers which must be evaluated for each situation.

5. The average value of owner-occupied homes by itself is a less satisfactory index; it correlated .82 with the composite indexes. This lowered value may be partly due to the small per cent of families owning homes; in Cincinnati the per cent was 38, and was considerably less than this in some census tracts—as low as 2%.

6. In a city in which there was less diversity or spread between the better and poorer sections all of the observed correlations would be lower, owing to the narrower ranges of the traits. Conversely, a greater spread between the high and low economic areas would tend to raise the correlations. This spread is affected by the extent of concentration of economically homogeneous groups in certain areas perhaps as much as by actual differences in conditions of families.

7. The problem here presented is essentially one of finding an optimum means for equating two series, without having any external criterion. The validity of the indexes therefore has to be argued on logical grounds rather than upon statistical evidence. The satisfactorily high correlations observed afford no objective evidence as to the ultimate validity of any of the methods reported; they indicate simply that all of the methods are rather consistent. This consistency however shows that the rational bases underlying the three methods all point in the same direction, and the validity of any one argument therefore tends to reinforce any soundness in the others.

8. It is entirely possible that such an economic index as the second and third ones here described may be more valid for general use than would average income if the latter were available. The indexes derived from rent and home value may reflect more accurately the amount of money families

are willing to spend in their communities, as contrasted with expenditures for travel, investments, or members of the family living elsewhere.

9. The actual ratios and curve equations found and presented in this study (footnotes 12 and 15) were based on 1933–1934 data gathered in various cities; they are probably not any more appropriate for Cincinnati than for other cities. They may therefore be used elsewhere with no greater error. They will probably be seriously affected by general economic changes in the relations between income, rent, and property value.[18] Any error in these relationships is however reduced in the process of combining, since the weighting for home values is much less than 100%. The resulting index will therefore not be as much in error as the equivalence ratio may be —except for non-compensating errors which may be in the original census data themselves.

10. The composites represented by the second and third methods differ from the usual form of statistical composite in educational work in being more highly structured and consequently more flexible and sensitive. The equating factor (representing differences in scale units and in weight) is not a single constant, such as is commonly employed when a fixed weight for any trait is used. Instead, the translation of home values into rents or income is accomplished by a set of ratios, each appropriate for a particular part of the scale; and the weighting varies from case to case (tract to tract) —in fact, from class interval to class interval within a single case. In comparison with such a structure the simpler forms of composite are relatively unresponsive to various elements.

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[18] Data gathered two years later than those of the *Financial Survey of Urban Housing*, used to establish relationships in this study, were obtained in 1935–1936 for the Consumer Purchases Study conducted jointly by the Bureau of Home Economics and the Bureau of Labor Statistics, with the cooperation of the Central Statistical Board and the National Resources Committee. These data, when available, may afford a basis for a reappraisal of the relationships presented in the present study. Further, the 1940 census will gather data on the estimated rental value of owner-occupied homes, affording a check on these relationships.

DO CHILDREN WHO PARTICIPATE IN A RICH VITAL SCHOOL CURRICULUM ACHIEVE GREATER CONTROL OVER SCHOOL SUBJECTS THAN DO CHILDREN WHO PURSUE A FORMAL CURRICULUM?

EDNA E. LAMSON
Associate Professor of Education State Teachers College
Jersey City, N. J.

Editor's note: More information is needed on the effectiveness of the new education. The author reports data upon a new vitalized curriculum and achievement in the school subjects.

PURPOSE

THIS study is one phase of the evaluation of the academic achievement of children in the Demonstration School at the State Teachers College, Jersey City, N. J. The Demonstration School, at the time these data were assembled in 1937, consisted of a kindergarten for four-year-olds, a kindergarten for five-year-olds and grades one through four. The function of the school is not that of a "practice" or "training" school. Its function is to demonstrate to prospective teachers what is considered best in curriculum and in procedures in the elementary school. All the teachers in the Demonstration School are master teachers. All hold the Master of Arts degree. All have had experience in teaching both children and college students. The curriculum is rich and vital according to approved criteria for curriculum construction. The growth and development of each child as an individual through participation in curriculum activities is the goal toward which each member of the Demonstration School staff strives.

The evaluation of the academic achievement was undertaken by searching for the answers to two questions: (a) To what extent are intelligence quotients increased by children who participate in a rich vital school curriculum? and (b) Do children who participate in a rich vital school curriculum achieve greater control over school subjects than do children who pursue a formal curriculum? The report on the answer to the first question was: "The intelligence quotients, as measured by the Stanford Revision of the Binet–Simon Intelligence Scale, of one-hundred forty-one children who have completed the fourth grade of the Demonstration School at the State

Teachers College, Jersey City, have not been increased by participation in a rich vital school curriculum."[1]

The present study addresses itself to the second question. The study deals with the objective measures from standard achievement tests by acknowledged authorities. Consideration has been given to the chronological ages, the intelligence quotients, the educational ages and the grade status scores of the several children, and to the specific promotion criteria of the Demonstration School. The statistical technique of analysis of variance has been used on all observed data. The technique of difference between means has been used in the situation where predicted scores were used instead of observed scores, because the latter were not available.

SUBJECTS

Of the one hundred forty-one children on whom data were collected for the first phase of this study in evaluation, one hundred eleven furnished data for the present, or second, phase of the study. These children were members of five successive fourth-grade classes from September, 1932 through June, 1937. All these children had been members of the corresponding third-grade classes of the Demonstration School each preceding year.

Distribution according to school years. There were twenty-one of these children in the fourth grade of 1932–1933; twenty in the fourth grade of 1933–1934; twenty-two in the fourth grade of 1934–1935; twenty-one in the fourth grade of 1935–1936; and twenty-seven in the fourth grade of 1936–1937. An earlier evaluation had not been undertaken because of the small number of children in the class of any particular year.

DATA

Chronological ages of the subjects. The chronological ages of these one hundred eleven children ranged from seven years eleven months to eleven year eight months, inclusive. All of the ages were computed as of the first of March in each fourth-grade class. The average chronological age of nine years nine months was approximately the same as the average age of the larger group of one hundred forty-one, for the same time in the school year.[2]

[1] Lamson, Edna E. "To What Extent Are Intelligence Quotients Increased by Children Who Participate in a Rich Vital School Curriculum?" *Journal of Educational Psychology*, XXIX (1938), pp. 67–70.

[2] Lamson, Edna E. Ibid., p. 68.

Intellectual ability of the subjects. The intelligence quotients of these one hundred eleven children, obtained by the application of the 1916 edition of the Stanford Revision of the Binet–Simon Intelligence Scale, ranged from 89.0 to 133.3, inclusive. The mean I.Q. of the group, 110, is approximately that of the larger group.[3]

Educational achievement. The records of the one hundred eleven children in the five successive groups provided objective test scores. Each child had a pair of achievement tests, the first administered the first of March in the third grade and the second administered the first of March in the fourth grade. The educational ages ranged from one hundred eleven months to one hundred fifty-seven months, inclusive, with the mean educational age at one hundred twenty-nine and five-tenths months. These data made possible not only an evaluation of achievement at yearly intervals, but also an evaluation of growth in school subjects over a period of one school year.

Distribution of test forms. The various forms of achievement tests, together with the respective dates of their administration in the third and fourth grade were:

Third Grade		Fourth Grade	
Class		Class	
1932 New Stanford Achievement Test	W	1933 New Stanford Achievement Test	Y
1933 New Stanford Achievement Test	Y	1934 New Stanford Achievement Test	X
1934 New Stanford Achievement Test	X	1935 New Stanford Achievement Test	V
1935 New Stanford Achievement Test	V	1936 Modern School Achievement Test	II
1936 Modern School Achievement Test	II	1937 Modern School Achievement Test	I

In the spring of 1935, The Modern School Achievement Test-Form I was administered to the third and fourth grades a month later than the New Stanford Achievement Test. The graphs based upon the scores of the children made on the subtests and the total scores of the two achievement tests produced approximately the same picture of class achievement. A table was constructed so as to yield grade status scores for the total test scores on the Modern Achievement Test. This table was so constructed as to give grade status scores, based upon educational ages, common to the New Stanford Achievement Test and the Modern School Achievement Test.

Promotion criteria. The promotion table used in the Demonstration School is a twelve-month table instead of the thirteen-month table usually

[3] Lamson, Edna E. Ibid., p. 68.

employed as the basis of norms for standardized tests.[4] The requirement for entrance to first grade is a chronological age and a mental age of six years three months, on the average. It is assumed that the average educational age also is six years three months. The grade status score for the fourth grade the first of March would be 4.6, and the mean educational age would be nine years nine months.

All the data were collected by the writer.

ANALYSIS OF DATA

The null hypothesis. The null hypothesis, posited prior to the statistical analysis of the data, may be stated as follows for the present study: There is no mean difference between achievement of children engaged in a rich, vital school curriculum and the achievement of children engaged in a formal curriculum. The results of the statistical analysis lead either to the acceptance of the null hypothesis, or to its rejection. The writer is conscious of the risk in reaching the wrong conclusion, in either of two ways. She may reject the hypothesis when it really is true; or she may accept the hypothesis when it is false, that is when some other hypothesis is true.

Statistical techniques. The homogeneity of the composite group, made by combining the five chronologically successive groups, has been ascertained with reference to chronological age, intellectual ability and scholastic achievement by application of the technique of analysis of variance and the F-test. The composite group was formed in order to have at least one hundred cases as the basis of the study. The significance of superiority in achievement has been determined by use of the technique of difference between means and the t-test.

The summary of the data involved in the determination of the homogeneity of the group is presented in Tables I, II, III and IV. Table I presents the summary of the analysis of variation in chronological ages from year-group to year-group.

F is 23.32. This is much larger than F_{01}. Hence, the variation within the group is greater than would be found ninety-nine times in a hundred

[4] McCall, W. A. *How to Measure in Education* (New York: Macmillan Company, 1922), p. 34.

TABLE I

VARIATION IN CHRONOLOGICAL AGE FROM YEAR TO YEAR AMONG FIVE SUCCESSIVE FOURTH-GRADE CLASSES

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F	F_{05}	F_{01}
Total variance	3277.35	110				
Intra-variance	1742.54	106	16.44			
Inter-variance	1534.81	4	383.70	23.33	2.30	3.20

as the result of chance factors.[5] The group lacks homogeneity with reference to chronological age.

The summary of the analysis of variation in I.Q.'s is presented in Table II.

TABLE II

VARIATION IN I. Q.'S FROM YEAR TO YEAR AMONG SUCCESSIVE FOURTH-GRADE CLASSES

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F	F_{05}	F_{01}
Total variance	5196.35	110				
Intra-variance	5186.12	106	48.92			
Inter-variance	10.23	4	2.56	19.10	5.66	13.57

F is 19.10. Since this is much larger than F_{01}, the variation in I.Q. is larger than would be expected in similar samplings ninety-nine times out of a hundred as the result of chance factors. The composite group lacks homogeneity with reference to intellectual ability.

Table III presents the summary of the analysis of variation of achievement from year to year, in terms of educational age.

F is 1.56. Since this is well within the ninety-five per cent limits, the variation is adjudged as not being significant. Since the variation in educational ages is not significant, the composite group of one hundred eleven children, made up from five chronologically successive groups, may be treated as one homogeneous group with reference to scholastic achievement. This

[5] Snedecor, G. W. *Statistical Methods* (Ames, Iowa: Collegiate Press, Inc., 1937), pp. 171–218.

TABLE III

VARIATION IN EDUCATIONAL AGE FROM YEAR TO YEAR AMONG FIVE SUCCESSIVE FOURTH-GRADE CLASSES

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F	F_{05}	F_{01}
Total variance	10447.3	110				
Intra-variance	10200.5	106	96.23			
Inter-variance	246.8	4	61.70	1.56	5.66	13.57

phenomenon of a group of individuals being homogeneous in one variate, and heterogeneous in other variates is not newly discovered.[6]

An attempt was made to determine whether the variation in achievement among various I.Q. groups was significant. The entire group of one hundred eleven children was divided into four I.Q. groups: (1) Below 101; (2) 101–110; (3) 111–120; (4) above 120. The achievement data in this analysis consisted of gain in terms of educational age over a period of one year, from third grade testing to fourth grade testing. This period extended from March of one year to March of the following year, for each of the five successive grade-groups. Table IV gives the summary.

TABLE IV

GAIN IN TERMS OF EDUCATIONAL AGE MADE BY FIVE SUCCESSIVE CLASSES OF FOURTH-GRADE CHILDREN CLASSIFIED INTO FOUR I. Q. GROUPS

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F	F_{05}	F_{01}
Total variance	9674.35	110				
Among IQ groups	72.54	3	24.18	4.07	8.56	26.23
Among classes	142.87	4	35.72	2.76	5.66	13.57
Error of variance	8970.37	91	98.57			
Interaction	488.57	12	40.71	2.42	2.35	3.46

The F's are much smaller than F at the five per cent level. Hence, the variation in achievement gain from IQ group to IQ group and from class to class is not surely significant.

[6] McGaughy, J. G. "Homogeneous Grouping", *Childhood Education*, VI (March, 1930), pp. 291–296.

COMPARISON WITH NORMS

Having determined that the composite group could be treated as a single group, a comparison was made between the achievement of the group and the norms on the tests used. The basis for this comparison was the score from the achievement test administered the first of March to each fourth-grade group. The common measure of comparison is the Grade Status Score corresponding to the educational age for each score. Table V presents this comparison.

TABLE V

THE ACHIEVEMENT OF ONE HUNDRED ELEVEN FOURTH GRADE CHILDREN IN COMPARISON WITH THE NORMS OF THE TWO ACHIEVEMENT TESTS USED

	Grade Status Score	Chronological Age	Educational Age
Achievement of Fourth Grade Children	4.6	9—9	10—9
Norm—New Stanford Achievement Test	4.6	10—6	10—6
Norm—Modern School Achievement Test	4.6	10—4	10—4

The average chronological age of the Demonstration School group, nine years nine months, is from seven to nine months less than the norms on the two achievement tests for the same time of the school year (4.6). The average educational age, ten years nine months, is three to five months greater than the norms on the same tests for the same time in the school year (4.6). The average educational age of this group is twelve months ahead of its average chronological age.

This group of children, which is from seven to nine months younger than the average class, has an average educational age from three to five months ahead of the average class. Is this superiority of educational age statistically significant? The assumption, as stated earlier in this study, is that the mean difference is zero.

In the table of norms for The New Stanford Achievement Test, and in the companion table constructed by the writer for The Modern School Achievement Test, the educational age and the chronological age for any given test score are identical. The assumption made is that the average I.Q. for each table is 100. Since the average I.Q. of the group being studied was 110, it became necessary to consider this superiority of ten points in

relation to the superiority of test score and corresponding educational age. This was done by predicting a theoretical average score on the standard achievement test to be expected from the group whose average I.Q. was 110.

The predicted score was arrived at as follows: The raw scores from the standard achievement tests listed earlier in the study were transmuted into derived scores through the two tables already mentioned. These derived scores were used as the X variate. The I.Q.'s obtained from 1916 Stanford-Binet tests were used as the Y variate. All the computations necessary for obtaining the regression equation were done by machine, following the technique of the Dunlap–Cureton Machine Correlation Chart. The coefficient of correlation was .545, with an S.D. of .06. The regression coefficient of x on y was .584. The mean of the I.Q.'s was 110, with an S.D. of 9.8. The mean of the observed test scores was 61.57, with an S.D. of 10.3. The test score (norm) on the standard achievement tests for the fourth grade as of the first of March (4.6) is 43. The predicted average score on the standard achievement tests for the group of one hundred eleven children having an average I.Q. of 110 was 48.84, with a standard error of estimate of 8.63.

The significance of the superiority of the obtained score (61.57) over the predicted score (48.84) was tested by the t-formula;

$$t = \frac{\text{Obs. mean} - \text{predicted mean}}{\frac{s}{\sqrt{n-1}} \quad \sqrt{1-r^2}}$$

Substituting the above values in the formula and solving for t, we have:

$$t = \frac{61.57 - 48.84}{.982 \times .838} = \frac{12.73}{.8229} = 15.4$$

When there are 110 degrees of freedom, t is approximately 1.984 at the five per cent level, and 2.626 at the one per cent level.[7] This sample value, 15.4, far exceeds even the one per cent level. This latter would be expected to occur only once in a hundred times if the difference were really zero. Since the t of 15.4 is so much larger, there must be a difference greater than zero and statistically significant. The writer, therefore, rejects the null hypothesis and concludes that the superiority of the average score of the group is statistically significant.

[7] Snedecor, G. W.: Op. cit., p. 55.

SUMMARY

The pattern, thus far, exhibits these elements. In five successive fourth-grade classes there was a significant variation in both chronological ages and intelligence quotients, accompanied by a non-significant variation in educational gain over one year in terms of educational age. The average achievement in terms of test scores was significantly superior to that predicted on the basis of an average I.Q. of 110. The variation in achievement gains from I.Q., group to I.Q. group, from class to class, was not significant. Out of these facts arises this question: Is the superior educational achievement of this group to be accounted for by some factor other than intelligence? The answer seems to be in the affirmative.

CONCLUSION

The writer concludes that this superior achievement score may be accounted for in terms of curriculum. The author has no device for extricating from the situation the influence of the broadly conceived curriculum that includes every experience of children. It seems justifiable, however, to assume that groups of children having an average I.Q. of 110 have approximately equivalent out-of-school curricula. The in-school curriculum, therefore, contributes largely to this superior achievement. The curriculum of the Demonstration School is an integration of life-experience through all round individual development.

We now arrive at the answer to the question which provided the purpose of this study: These children who participated in a rich vital school curriculum achieved greater control over school subjects than do children who pursue a formal curriculum.

The writer, furthermore, ventures a generalization as a result of this study in evaluation: While well-organized and well-guided progressive schools do not increase the intelligence quotients of children, as measured by available instruments, their curricula do help children to attain superior scholastic achievement, even when allowance has been made for intellectual ability.

CHARACTERISTIC ERRORS OF GOOD AND POOR SPELLERS

GEORGE SPACHE
Friends Seminary, New York City

Editor's note: The author applies a none too frequently employed technique of research to a common school problem. The technique deserves wider use.

A NUMBER of writers have compared the errors of matched or picked groups of good and poor spellers or bright and dull children. Spellers were contrasted by Russell (9) and Umberhine (12), and bright and dull children by Carroll (3, 4). Umberhine concluded that there were no significant differences between the groups of good and poor spellers in the per cent of the various errors they made. Russell concluded that retarded spellers made a greater number of errors of addition. Carroll found that the dull erred more in per cent of addition, omission and substitutions of groups of letters, and in substitution of an actual or an irrelevant word. The bright erred more in addition by doubling, single additions, omissions of doubled letters and single letters, in single letter substitutions and transpositions. It is the purpose of this article to re-evaluate these studies in the light of the techniques and results of more recent research.

The data for the present study are derived from the spelling errors of 25 average and 25 poor spellers of grades III–V. The poor spellers were chosen at random from among those brought to the writer for assistance. The average spellers were selected from the pupils of Friends Seminary and Brooklyn Friends School, of New York City. They are children who, on standardized spelling tests of two successive years, evidenced no greater acceleration or retardation than six months above or below their exact grade status. The misspelled words were derived from a 100-word test from the appropriate 50 percent column of the Buckingham–Ayres Scale. The system of classifying spelling errors employed here is fully described in two preceding articles (10, 11).

The writer is fully aware that the size of the population involved in this study limits the significance of its results. It has been demonstrated elsewhere (10, 11), however, that the system of classifying spelling errors employed here is valid. The distribution of errors that it effects is almost identical with that found by averaging the findings of twenty-two earlier

writers. Furthermore, the reliability of the classification as a whole is superior to other common classifications employing the categories of omissions, additions, transpositions and substitutions only, when Kelley's formula for total reliability (7) is applied.

There appears to be some confusion in the use of formulas for determining the standard error of the differences between the groups of good and poor spellers. Carroll and Umberhine used the usual short formula for finding the S.D. of the difference between the means, medians, etc. of unrelated data, i.e. S.D. $_{diff.} = \sqrt{\sigma_{Mx}^2 + \sigma_{My}^2}$ Since their data were expressed in per cents, the correct formula is that given by Bowley (2) in which S.D. $_{diff.} = \sqrt{\frac{pq}{N} + \frac{p'q'}{N'}}$. Russell claims to have used the latter formula but the present writer has been unable to secure the same Critical Ratios. The findings of Carroll (3, 4) Russell (9), Umberhine (12) and the present study are presented in Table I. The standard errors of the differences are computed by Bowley's formula.

The application of the more accurate formula alters the interpretations of Carroll and Russell. As in the other studies, their differences are insignificant. In none of the 59 possible comparisons between the per cent of error of good and poor spellers or bright and dull children are the differences reliable. These results warrant several conclusions of significance for future investigators: 1) that when all the errors of a particular type of an entire group are added together and expressed as per cents of the total errors of the group, no real differences appear between groups of good and poor spellers or bright and dull children in the various categories of errors, and 2) use of this method of tabulating spelling errors may conceal the inherent differences between good and poor spellers.

Since, in the final analysis, the classification of spelling errors is intended to aid in understanding the difficulties of individuals, it would appear logical to tabulate the number and per cent of errors of individuals as well as of entire groups. Although the group may be greater than the sum of its parts, the average score of the individuals comprising the group may reveal more of its characteristics than the sum of their errors. In other words, finding the mean per cent or mean number of each type of error will yield more information than finding the number or per cent of each error committed by the entire group.

TABLE I

DIFFERENCES IN THE PER CENT OF ERROR OF GOOD AND POOR SPELLERS

Reference	Carroll (2, 3)			Russell (6)			Umberhine (9)			Present Study		
	Diff.	°diff.	C. R.	Diff.	°diff.	C.R.	Diff.	°diff.	C.R.	Diff.	°diff.	C.R.
Omissions												
Single letter												
silent	5.9*	.059	1.00				4.0	.062	.64	1.2	.091	.13**
sounded	"	"	"				"	"	"	2.4	.086	.27
doubled	2.7	.030	.90				1.0	.034	.29	1.7	.067	.25
Syllable	2.6	.027	.95				2.0	.033	.60	1.7	.039	.43
Total	6.0	.066	.90	2.8	.083	.33	5.0	.072	.69	1.3	.130	.10
Additions												
Single letter												
doubling	1.5	.027	.72				4.0	.036	1.11	.3	.048	.06
non-doubling												
phonetic	1.5	.048	.30				2.0	.057	.35	3.5	.052	.67**
non-phonetic	"	"	"				"	"	"	.01	.081	.001
Syllable	.4	.015	.26				1.0	.021	.47	.25	.027	.09
Total	2.6	.051	.50	2.5	.059	.42	5.0	.067	.74	4.0	.103	.03
Transpositions												
Phonetic										.0	.028	.00
Non-Phonetic										1.0	.051	.19
Total	1.5	.029	.51	1.0	.035	.28	6.0	.045	1.33	.5	.058	.86
Phonetic Substitutions												
vowel	2.3	.059	.37							3.3	.108	.30
consonant	"									.3	.084	.03
diphthong	"									.0	.039	.00
syllable	6.8	.054	1.26							2.0	.061	.32
entire word										1.0	.034	.29
Total	6.5	.069	.94							4.6	.136	.33
Non-Phonetic Substitutions												
vowel										1.2	.034	.35
consonant										1.0	.051	.19
diphthong										.0	.028	.00
syllable										.5	.034	.14
entire word	6.5	.027	2.32							.44	.028	.15
Total				2.8	.081	.34	5.0	.081	.61	3.1	.074	.41
Homonyms										.2	.028	.07
Incomplete										2.6	.044	.59
Unrecognizable										2.2	.039	.56

* Ditto marks are used to indicate that the single figure given includes the successive error types so marked.

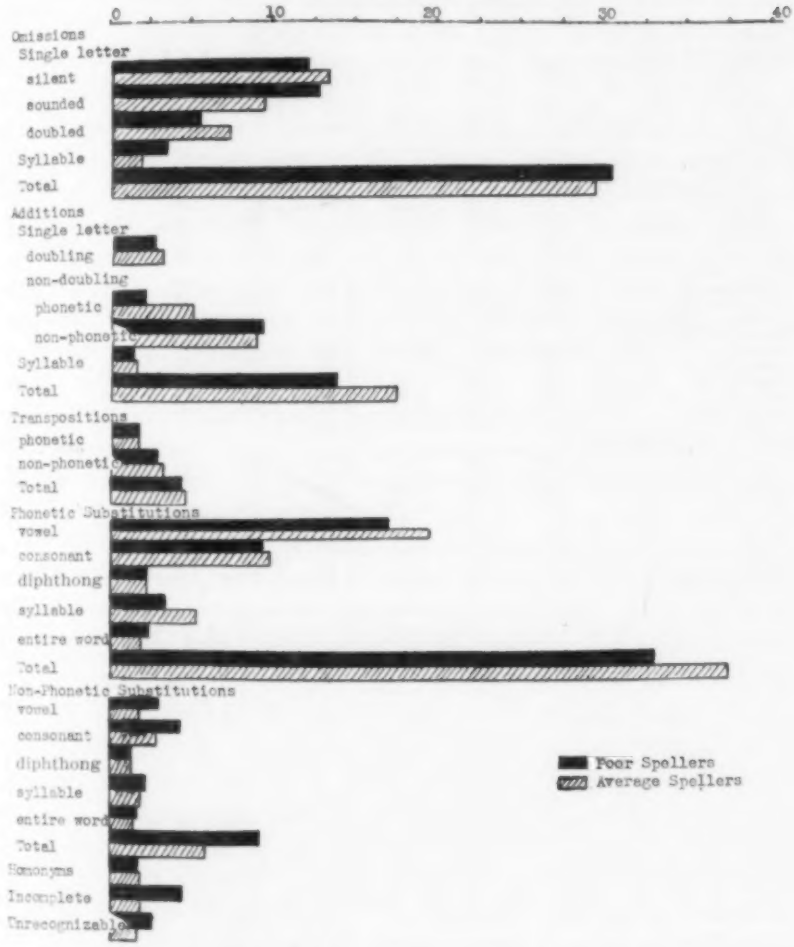
** To permit direct comparison with the other studies, the C.R. of silent and sounded letters is .10; of phonetic and non-phonetic single additions, .37.

The table is read "The difference between the percents of error of the two groups in Carroll's study in ommission of silent and sounded letters was 5.9. The S. D. of this difference is .061 and the Critical Ratio, .96".

To illustrate by a hypothetical test in arithmetic, one would probably not attempt to determine how many examples were missed by the entire class. It is of little value to know that on a test of ten examples given to a fifteen-pupil class, fifty examples were wrong, although this is one method of determining the class average. The teacher would certainly rather know how many examples the average child missed, what the individual scores were and what the range of error was. Similarly, in tabulating spelling errors the diagnostician is interested in knowing how many and what kind of errors are made by the average child, how the individuals of the group differ and how each child differs from a hypothetical average child.

FIGURE 1

MEAN PER CENT OF ERRORS OF POOR AND AVERAGE SPELLERS



In Table II are presented the mean per cent of errors of the 50 average and poor spellers of the present study.

Statistically significant differences appear in several error types. Average spellers make a greater per cent of phonetic additions of single letters and

TABLE II

MEAN PER CENT OF ERRORS OF POOR AND AVERAGE SPELLERS

	Poor Spellers		Average Spellers					Chances of
	Mean	Sigma	Mean	Sigma	Diff.	°diff.	C.R.	real diff.
Omissions								
Single letter								
silent	12.04	3.66	13.48	4.52	1.44	1.22	1.18	8810
sounded	12.66	6.54	9.54	4.02	3.12	1.52	2.05	9798
doubled	5.72	2.82	7.4	3.82	1.68	.94	1.78	9625
Syllable	3.42	3.96	1.66	1.11	1.76	.81	2.17	9850
Total	30.7	6.75	29.9	6.95	.80	1.93	.41	6591
Additions								
Single letter doubling	2.98	2.41	3.26	1.94	.28	.60	.46	6772
non-doubling								
phonetic	2.1	2.12	5.48	3.88	4.38	.87	5.03	10000
non-phonetic	9.52	4.96	9.2	4.2	.32	1.28	.25	5987
Syllable	.82	.54	1.1	1.05	.28	.22	1.27	8980
Total	14.0	4.8	18.0	5.28	4.0	1.42	2.81	9975
Transpositions								
Phonetic	1.5	1.29	1.5	1.38	.00	.37	.00	5000
Non-Phonetic	3.22	2.35	3.74	2.37	.52	.66	.78	7823
Total	4.44	2.8	4.84	2.64	.40	.76	.52	6985
Phonetic Substitutions								
vowel	17.04	6.64	19.76	6.08	2.72	1.77	1.53	9370
consonant	9.3	5.01	10.02	4.53	.72	1.34	.53	7019
diphthong	2.58	2.08	2.58	1.85	.00	.55	.00	5000
syllable	3.48	2.08	5.96	2.72	2.48	.68	3.64	9998
entire word	2.76	3.06	1.72	1.36	1.04	.67	1.55	9394
Total	33.5	9.05	37.9	9.15	4.4	2.5	1.76	9608
Non-Phonetic Substitutions								
vowel	3.16	3.94	1.64	1.34	1.52	.82	1.85	9678
consonant	4.28	2.76	3.0	2.76	1.28	.78	1.64	9495
diphthong	.66	.46	.66	.46	.00	.12	.00	5000
syllable	1.98	1.62	1.42	1.23	.56	.40	1.40	9192
entire word	1.1	.89	.9	.77	.2	.22	.90	8159
Total	9.54	5.67	6.18	3.87	3.36	1.35	2.48	9934
Homonyms	1.42	.97	1.66	1.08	.24	.28	.85	8023
Incomplete	4.5	4.92	2.1	1.44	2.4	1.02	2.35	9906
Unrecognizable	3.8	3.94	1.8	2.26	2.0	.90	2.22	9868

The table is read, "Twenty-five poor spellers made an average of 12.04 per cent of errors of ommission of silent letters while 25 average spellers made an average of 13.48 percent of the same error. The Critical Ratio of the difference between the means is 1.18 which indicates 8810 chances in 10,000 of a real difference greater than zero". The S.D.'s of the difference were computed by the usual short formula used with unrelated data.

phonetic substitutions for a syllable. Although the differences are not wholly reliable, average spellers make more total additions while poor spellers exceed in the per cent of omission of sounded letters and syllables, total non-phonetic substitutions, incomplete and unrecognizable spellings. With the exception of non-phonetic additions, all errors of addition are made in greater number by the average spellers. With the exception of the substitution of an entire word, and for a diphthong, all errors of phonetic substitution are made in greater number by the average spellers. With the exception of diphthongs, where there is no difference, all errors of non-phonetic substitution are made in greater number by the poor spellers.

If the error categories are arbitrarily divided into the opposing types of phonetic and non-phonetic, there appears to be a definite tendency for

the average spellers to make more phonetic errors and for the poor spellers to make more errors of the non-phonetic variety. Similar conclusions were reached by Carroll (3, 4) in his contrast of bright and dull children. Although quantitative data were not given, Floyd (5) noted that the dull children showed less tendency to phonetic and more tendency to freakish misspellings than the bright.

Phonetic errors are those made in an attempt to spell the word the way it sounds. They include omission of a silent or doubled letter, addition by doubling, phonetic additions and transpositions, phonetic substitutions and confusion of homonyms. The remaining types may be classed as non-phonetic errors, i.e., those not resulting in spelling a word as it sounds. In eight of the eleven phonetic types of error, average spellers exceed poor spellers in per cent of errors. In phonetic substitution for a diphthong, there is no difference. In phonetic transpositions and phonetic substitution of an entire word, poor spellers exceed.

In nine of the twelve non-phonetic types of errors, poor spellers exceed the average in per cent of errors. In non-phonetic substitution for a diphthong there is no difference. In non-phonetic transpositions and in the addition of a syllable, average spellers exceed.

It would be possible to make similar comparisons between the mean number of errors of each type of the two groups. Space does not permit the reproduction of these data but the implications are almost identical with those of Table II. Significant differences appear in number of errors in several types. Average spellers make a greater number of phonetic additions of single letters. Poor spellers exceed in the number of non-phonetic substitutions for a syllable and in incomplete and unrecognizable spellings. Although the differences are not wholly reliable, average spellers make more phonetic substitutions for a syllable while poor spellers omit more sounded letters and make more non-phonetic substitutions, particularly in vowels. In eight of the eleven types of phonetic errors, average spellers exceed the poor spellers. In nine of the twelve non-phonetic types of errors, poor spellers exceed in number of errors.

It would appear that the intrinsic differences between the errors of good and poor spellers are concealed in comparisons between the sum of the errors of the groups. Comparisons based upon the mean number or per cent of errors reveal the following:

1. When errors are classified as phonetic and non-phonetic, there appears a definite tendency for the average spellers to make a greater number and per cent of phonetic errors than do the poor spellers. Conversely, there is an equally definite tendency for the poor spellers to make a greater number and per cent of non-phonetic errors than do average spellers.

2. Specific error types in which average spellers may exceed in number or per cent to a significant extent are phonetic addition of single letters and phonetic substitution for a syllable.

3. Errors in which poor spellers may exceed average spellers to a significant extent are non-phonetic substitutions for a syllable, incomplete and unrecognizable spellings.

4. Although not wholly reliable differences were found in the present study, there appears to be a strong tendency for average spellers to exceed the poor in number and per cent of total additions. Similarly, there is a strong tendency for poor spellers to exceed in number and per cent of omission of sounded letters, omission of a syllable and total non-phonetic substitutions.

These results are confirmation of the indications of other studies that poor spellers are lacking in auditory discrimination and phonic skills and knowledges. Russell (9) has shown that poor spellers were inferior in auditory discrimination as measured by the common test of distinguishing between pairs of words of similar sound. The excessive errors of omission of sounded letters and syllables of poor spellers are due, at least in part, to this lack of accurate auditory discrimination.

Poor spellers were reliably inferior in such phonic skills as giving letters for letter sounds, blending letters to form syllables and words, and spelling one- and two-syllable nonsense words according to Russell (9). McGovney reports (8) poor spellers distinctly inferior in giving sounds for letters and sounds for two-syllable phonetic words. Baker (1) states that a number of his poor spellers experienced difficulty with phonics, although he does not describe his methods of testing. Among others, Gates (6), Wells (13) and Russell (9) have noted the inability of poor spellers to make a varied or analytic approach to new words. Their methods are characterized by 1) unsystematic division into various word units, or incorrect syllabication, 2) by spelling by minute phonic units, 3) spelling letter by letter, and 4) lack of syllabication or syllabic analysis.

Such errors as non-phonetic substitution for a vowel, consonant, etc., and non-phonetic single additions in which poor spellers exceed are further

evidence that they lack adequate phonic skills and knowledges. The inference is further illustrated in the fact that good spellers make a greater number and per cent of errors of phonetic addition of a single letter and phonetic substitution for a syllable. In other words, poor spellers lack the necessary knowledge and therefore make fewer attempts to substitute or add phonetically.

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THE IOTA FUNCTION

CHARLES A. DRAKE
Director, Bureau of Instructional Research
West Virginia University

Editor's note: The comparability of units of measurements has been considered important among technical workers in this area for some time. The author presents new data and a new approach to this problem.

IS THERE an underlying growth factor, other than intelligence as measured, that is significantly related to achievement? For decades we have been awarding scholarships and other honors to students who were selected by some measure of academic excellence. We have indulged the hope that students of high scholarship, or of high scholarship associated with high measured intelligence, were the ones who would continue to merit distinction by continued personal growth and by the advancement of their professions. We have been at a loss to explain convincingly the spectacular later achievements of some whose academic records were mediocre or worse, as well as the apparent retrogression to mediocrity of many who seemed to show exceptional promise.

It is a fair inference, from the several definitions of intelligence as well as from the nature of intelligence test results, that the more intelligent studnts should make the greater progress over a given period of time on successive standardized achievement examinations. Certainly the greater capacity for learning attributed to the more intelligent should be reflected in larger increments of growth on such examinations. We are confronted with a major perplexity when we find evidence that points to a lack of such relationship, or to a slightly inverse relationship, as shown in Table No. 1.

The standardized test data in this table were computed from scores made on Forms O and N of the Cooperative Test Service Biology Test given at the beginning and end, respectively, of a one-semester course in college General Biology. Raw scores were converted to standard scores of Mean 50 and S.D. 10 by the scale supplied with each form of the test.

The gain for each student was the difference between the standard score on the second test and the standard score on the first test. Department grades were based on the results of five excellent objective examinations, totalling more than three hundred items, compiled by the department and given at intervals during the semester. The "intelligence" test was the American Council Psychological Examination for College Freshmen, 1938 Edition.

TABLE I

INTER-CORRELATIONS BY GROUPS

		1st S. S.	2nd S. S.	Gr. By Dept.	Gain Pts.	Int. Percentile
1 YR. GROUP N=217	1st S. S.*		.69	.58	—.57	
	2nd S. S.	.69		.67	.19	
	Grade	.58	.67		.04	
	Gain	—.57	.19	.04		—.14
	Intell.				—.14	
"NONE" GROUP N=42	1st S. S.		.60	.57	—.47	.34
	2nd S. S.	.60		.74	.43	.08
	Grade	.57	.74		.19	.27
	Gain	—.47	.43	.19		—.29
	Intell.	.34	.08	.27	—.29	
50 Highest and 50 Lowest by Dept. Grade	1st S. S.		.62	.66	—.14	.44
	2nd S. S.	.62		.38	.23	.27
	Grade	.66	.38		.22	.62
	Gain	—.14	.23	.22		.05
	Intell.	.44	.27	.62	.05	

*S. S. = Standard score.

The first part of Table No. 1 shows the interrelationships for the group numbering 217 who had completed a one-year course in Biology in high school; the second part shows the results for the 42 who had not studied Biology previously; the third part shows the results for a group made up of the 50 who received the highest grades by the department tests and the 50 who received the lowest grades by this method.

Although most of the relationships shown in Table No. 1 are within the usual limits, one fact is conspicuous and perplexing. This is the failure of gain scores to correlate significantly with intelligence as measured by the A.C.E. test. While this latter test is designated a "scholastic aptitude test", one may infer that it is measuring the aspects or kinds of intelligence that are significant in scholarship. It normally correlates .4 to .7 with grades and other criteria of scholarship.

The distributions of the standard scores on the two forms of the standardized examination are shown in Table No. 2. A separate distribution of the gains is shown in Table No. 3. The average gain, computed from individual scores before they were grouped in class-intervals, was 10.3 standard score points—just over one S.D. on the standard score scale.

When the study was continued for two semesters with 88 students for whom complete records were available, practically the same results were obtained, as shown in Table No. 4. However, a new perplexity is presented

TABLE II

DISTRIBUTIONS OF STANDARD SCORES

Scores	Frequencies Form O	Form N
72–76		4
67–71		10
62–66	4	33
57–61	21	86
52–56	47	86
47–51	56	35
42–46	65	15
37–41	41	5
32–36	29	2
27–31	12	1
–26	2	
Averages	45.75	56.08
Average Gain		10.3

TABLE III

DISTRIBUTION OF GAINS

Scores	Frequencies	
25–27	4	
22–24	11	
19–21	10	
16–18	23	
13–15	50	
10–12	51	
7– 9	63	
4– 6	29	
1– 3	22	
—2–0	7	
—5–3	7	Average Gain 10.3

TABLE IV

TWO-SEMESTER BIOLOGY INTER-CORRELATIONS

	1st S. S.	2nd. S. S.	3rd. S. S.	1st. Gain	2nd. Gain	Grade	Intell. Percentile
1st. S. S.		.73	.67	—.39	—.40	.49	.40
2nd. S. S.	.73		.75	.34	—.29	.67	.41
3rd. S. S.	.67	.75		.07	.40	.79	.39
1st Gain	—.39	.34	.07		—.35	.23	.02
2nd. Gain	—.40	—.29	.40	—.35		.20	—.01
Grade	.49	.67	.79	.23	.20		.46
Intell. percentile	.40	.41	.39	.02	—.01	.46	

by one figure in this table. The correlation between First Semester Gain and Second Semester Gain is –.35. This value is too large to be explained by sampling error. The most acceptable tentative explanation seems to be one derived by analogy from the Isochronic Growth Curve hypothesis of S.A. Courtis, which will be referred to later.

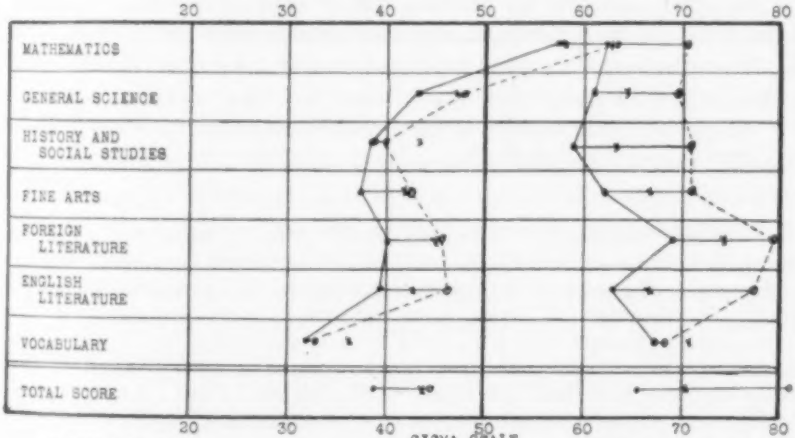
In spite of the foregoing evidence from correlation analysis, though the reliabilities of the coefficients and of the instruments by which the data were derived are known to be high, one might be inclined to minimize the significance of the phenomena. However, there is supporting evidence from other sources.

The Pennsylvania Study, reported by Learned and Wood in Bulletin Number 29 of the Carnegie Foundation for the Advancement of Teaching, presents evidence to support the hypothesis that whatever is responsible for this gain is largely independent of both scholarship and intelligence. Figure No. 1 is a reproduction of the essential features of the figure presented on page 34 of the foregoing report.

This figure presents the starting and finishing positions of two typical students, measured at the end of the sophomore year and again at the end of the senior year. Both are stated by the writers to have averaged about C in scholarship. The horizontal distance, from the solid black disc on the left to the circle on the right, shows the amount of gain in each of the several subject-matters tested in terms of S.D. It is clear that the student on the right is much superior in level to the one on the left, and that he gained more during these two years than did his fellow.

The astonishing feature in this comparison is the fact that both students made gains in fine arts, in foreign literature, and in English literature at least as great as the gains made in the subjects more closely related to their curriculum. Both of these students were in an engineering school. We can

TYPICAL PROGRESS PROFILES OF STUDENTS TAKING THE COLLEGE SOPHOMORE–SENIOR EXAMINATIONS 1930–1932



not, even with the utmost deference to the engineering curriculum and the cultural environment in which it operates, attribute such results to conditions controlled by the schools. It is interesting to note that neither student made any significant gain in vocabulary, the one subject that is closely connected with intelligence as usually measured.

This phenomenon is of the utmost educational significance and may not be lightly dismissed. Neither may it be convincingly explained by the usual hypotheses. Study of the data of the whole Pennsylvania report supports the contention of its writers that these two cases are typical, and the gains shown have been reliably measured.

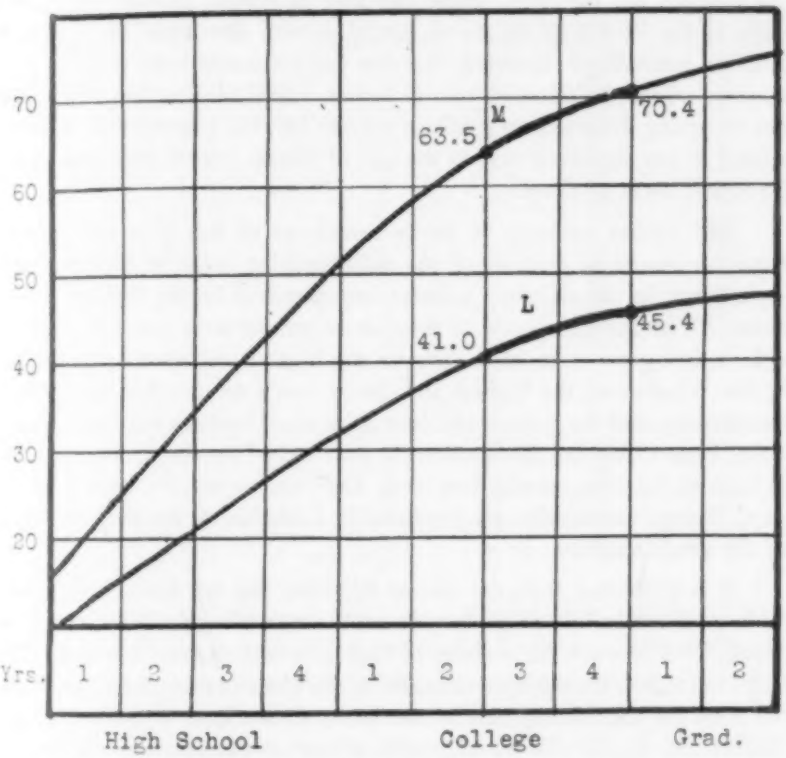
If we average the gains made by these two students and present them as segments of curves following the pattern of known growth curves, as is done in Figure No. 2, we may make several further inferences. Student M, the one represented on the right in Figure No. 1, began at a higher level, gained at a greater rate, and finished at a much higher level than student L. If we project the curves, which are factual only for the last two years of college, backward through the high school years and forward through several graduate years we may conclude that M is throughout the period the student of greater promise.

Regardless of scholarship, for they are approximately equal, or of intelligence, in which they may be presumed to be equal, M would seem to be the better candidate for graduate and professional schools. He would seem to have better promise of continued growth and accomplishment than L. The same conclusion might have been reached many years earlier in their careers if suitable comparable measurements had been available.[1]

There is further support in the Pennsylvania Study for the hypothesis that the function involved follows the pattern of known growth curves, such as:

"When students are arranged according to chronological age, their gains in achievement from 1930 to 1932 follow closely the already familiar differences. The gain (.92 sigma) achieved by the first, the 19-year-old group, in its subject of largest gain, fine arts, is more than twice the gain (.38 sigma) attained by the last, the 27-year-old group, in the same field, which was likewise its subject of largest gain. The average gains in total score by ages run from .60 sigma to .33 sigma in the nine age groups represented, a gradual slowing down, as age advances, of nearly two to one. The reader should bear in mind that this is due not to age but to the selection which brings the brighter student earlier to college."[2]

IOTA CURVES
(Hypothetical)
TWO TYPICAL STUDENTS



We are not willing to agree with the conclusion expressed in the last sentence which implies that rate of gain is due to "brightness" or intelligence. We suspect rather that the curve of the function tends in general to flatten out during the college years. This inference receives support from the observation reported as "a gradual slowing down, as age advances" in the above quotation.

Since "one-sixth even lost ground academically during a two-year trial period"[3], we may infer that many students pass the maximum of their growth curve during this period. The effort to instruct them beyond this point seems to be largely wasted. An alternative inference, which would also be

useful in explaining the low negative relationship between first-semester gains and second-semester gains noted in Table No. 4, is that the curve of the function has the same "cyclic character of mental growth"[4] characteristics as the isochronic curves of mental growth developed by Courtis. It must be pointed out, however, that the Courtis curves tend to reach their maxima around the sixteenth year or earlier, while this function is shown in our foregoing discussion to continue actively into the twenties and to be unrelated in any significant way to the sort of mental growth expressed by the isochronic curve of Courtis.

Still further evidence of the independence of this gain factor comes from the results of analyses of the differentiating value of separate items (questions) in the objective examinations prepared by the Biology department. All of the items used in these examinations were analyzed for their differentiating power by three criteria: the highest and lowest grades given by the department, the highest and lowest levels on the first standardized examination, and the greatest and least gains made between the two examinations. Papers from the fifty students at each end of the distribution of scores by each of the three criteria were used. Only ten consecutive items from the third Biology examination are presented in Table No. 5, but they are typical of the whole analysis.

It is quite clear from the data of this table that test items, either singly or in combination in a single test, do not measure this gain phenomenon nor discriminate between the students of high gain and those of low gain. This helps to confirm the dynamic character of the phenomenon and to emphasize the need for considering time as one of its dimensions. These two considerations also suggest that the phenomenon may be inaccessible to the methods of factor analysis, since the latter are better adapted to static or geometrical relationships than to dynamic or growth phenomena.

In view of all the foregoing considerations it seems necessary to predicate a dynamic function that is neither intelligence nor scholarship as these are usually measured. While such a function appears to be a "potentiality for growth" that is released under suitable environmental stimulation, it seems desirable to define it simply as: THE FUNCTION RESPONSIBLE FOR SUCCESSIVE GAINS ON COMPARABLE FORMS OF STANDARDIZED SUBJECT-MATTER EXAMINATIONS. The term "Iota Function" is applied for convenience, and to restrict the present meaning to this definition.

TABLE V

DIFFERENTIATING VALUE OF TEST ITEMS—3 BASES
DATA FROM TEN CONSECUTIVE ITEMS OF THIRD BIOLOGY TEST

BASIS	Item No.	% of Students marking item correctly		Percentage Difference (Differentiating Value)
		Highest	Lowest	
Dept. Grade	1	76	62	14
	2	70	36	34
	3	82	52	30
	4	60	20	40
	5	68	24	44
	6	96	78	18
	7	94	72	22
	8	98	64	34
	9	90	64	26
	10	88	76	12
Level on First Std. Exam.	1	80	66	14
	2	62	42	20
	3	84	64	20
	4	52	24	28
	5	56	38	18
	6	94	84	10
	7	96	78	18
	8	96	66	30
	9	82	74	8
	10	84	80	4
Gain on Std. Exams.	1	76	68	8
	2	62	44	18
	3	64	78	—6
	4	22	38	—16
	5	42	40	2
	6	88	90	—2
	7	84	88	—4
	8	82	88	—6
	9	68	74	—6
	10	78	70	8

In the Pennsylvania Study there are reported some striking instances of institutional and individual failures to show growth or gain during the experimental period. This phenomenon is attributed largely to lack of facilities and to lack of suitable motivation.

With this explanation we can not agree, in the light of our findings. The evidence points to the normal distribution of the Iota Function in the population, like other individual differences. The phenomenon of failure to show growth seems rather to be the result of selection of students than the result of lack of facilities and motivation.

One is tempted to suggest that the concept of the Iota Function offers at least a plausible explanation of the failure of many, if not most, of those children of a precocity bordering on genius to sustain their early rates of growth through late adolescence and early adulthood. The gradual flattening of the growth-curve and the attainment of its maximum would have such an effect.

A complete and conclusive test of the Iota Function hypothesis will involve a prolonged experiment, covering the application of comparable forms of standardized subject-matter examinations from the earliest years through the college and perhaps beyond, involving the same representative sample group. Only in this way can we get the basic data for prediction and control—the ultimate aim of all science.

Several correspondents have suggested that the failure of gains to show consistent positive correlation with intelligence tests scores may be due to the familiar regression phenomenon. It is only necessary to point out that the average gain, 10.3 standard score points, is so much greater than the standard error of scores, between 3 and 4 points, that this possibility must be eliminated. Moreover, this would not explain the gains in subject matters not studied as against the gains in subject matters closely related to the curriculum.

We have studied our data intensively over a considerable period of time, attempting to find among familiar psychological hypotheses one that would fit all the facts. One by one we have been forced to abandon what at first appeared to be easy and obvious explanations, arriving at last at what seemed to be the necessity for the Iota Function hypothesis. There seems to us to be adequate basis for the hypothesis presented. The next step, verification, promises to be long and arduous, but it is hoped that our interested colleagues may attempt it.

Note: Since writing the foregoing, we have made a similar analysis of the results for 252 students in Modern European History over a period of one semester and for 142 of these students over two semesters. With a different subject matter and with a different method of awarding grades, the results are not substantially different from those reported in the Biology study. Work is still continuing on a one-year study in French.

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STANDARDS FOR GRADUATION FROM SECONDARY SCHOOLS*

LESTER F. JOHNSON and OTHERS
York, Pennsylvania

Editor's note: The last decade has seen much excellent work and a complete over hauling of standards for accrediting secondary schools. The author presents suggestions relative to graduation standards in secondary schools.

THE purpose of this study was (1) to determine current practices concerning graduation requirements; and (2) to attempt to devise a plan from studies of surveys and recommendations that have been made on the subject, added to the findings of the committee, that would recognize individual abilities, needs, and interests as well as standards of the community for specific types of service, particularly occupational services and specialized leadership.

The fixing of standards for graduation from the secondary school should presuppose the incorporation of a basic philosophy of education supported by well defined objectives, tested and approved methods, and an adequate curriculum that is so comprehensive that it meets all the varying needs of the different ability groups in the school. Not until there has been an analysis of the educational problems confronting the school and this is followed by efficient functioning of the vocational guidance program and a proper evaluation and variation of the school curriculum so as to meet the varying needs of the individual students, can there, in fairness to the pupils, be applied the appraisal of the school to the accomplishments or development of its students.

The committee is of the opinion that graduation from a secondary school means that the pupil has made satisfactory progress within the school program and now has reached that stage in his or her development where the school can give its approval to the student and encourages that student to take the next step in further preparation for successful living.

Standards for graduation are here considered as no more nor no less than the minimum expectations set by the school for each student in his or her individual development. Development or growth should take place in direct proportion to latent and special abilities.

* This study was sponsored by Dr. E. D. Grizzell, University of Pennsylvania, and was made by the following members of an extension class in secondary school curriculum held in York, Pa., under the instruction of Dr. Grizzell: George Kauffman, Harvey E. Swartz, Charles W. Yaukey and Lester F. Johnson (Chairman).

Standards for graduation should be expressed in terms of the objectives of the school and should vary so as to apply to the varying possibilities for growth in students.

The curricula, requirements for graduation, and provision for individual differences were studied from descriptive material and letters obtained from sixty-one secondary schools by the committee, each school a member of the Middle States Association of Colleges and Secondary Schools and accredited by that regional association. The schools considered were 46 public schools and 15 private schools, with enrollments that ranged from 100 to 10,000. Among the schools were commercial schools, vocational schools, college preparatory, parochial, and public high schools.

The committee met the following difficulties in interpreting replies from these schools:

1. There was insufficient descriptive material concerning content of courses of study.

2. No information was available on outcomes nor were data secured on the comparative success of students who had graduated from the various schools under consideration.

3. In the majority of cases studied, it was impossible to determine from available material the philosophy of the school pertaining to the failure of students to meet subject content in the prescribed courses of study.

4. Data were secured from catalogues, leaflets, and booklets designed attractively, in some cases, for purposes of publicity as well as for information and guidance to students.

5. No data were available on the effectiveness of instruction.

6. No information was obtained regarding the type of community so as to determine the appropriateness of the curricula for that community.

Some of the outstanding facts obtained by the committee were:

1. Each school studied, recognized work completed in the curriculum either by Carnegie units or points which were merely measures of satisfactory attendance of class or group meetings over a required time period.

2. Variations in curricula were discovered ranging from one progressive school with no definitely prescribed course of study (only English and physical education were required during each of the four last years spent in the secondary school; music, and art were required in the ninth grade)

to another public high school for boys with 17 well defined curricula, each with only slight variations in unit requirements.

3. Two or three of the schools designated minimum scholastic attainment in courses of study in order to receive certification or opportunity to carry the fifth subject in the prescribed course of study.

4. One school listed four curricula known as the college diploma course, the vocational or shop work diploma, the commercial, and the liberal arts.

5. One school allowed one-half credit for unprepared courses covering a definite time spent in class and recognized outside study in music.

6. Only one school made practical provision for the non-academic student in its school program.

For the purpose of summarizing the findings, the various curricula from the 61 schools were grouped under three divisions, namely, the Academic courses, the Academic-Vocational courses, and the Academic-Vocational-Non-Academic courses. Under Academic courses were listed the schools that concentrated upon the preparation of their students for college. Schools providing in their curricula both for college preparatory courses and vocational courses came under the heading of Academic-Vocational. Schools that professed to provide not only for the above two type students but gave recognition of any sort to the non-academic student were listed as Academic-Vocational-Non-Academic schools. The committee agreed that in its judgment only one school had made appreciable progress in adequately providing for the non-academic type student. The non-academic student was defined by the committee as the student who is unable to profit by the formal course of study which requires the normal functioning of memory, reasoning, proper association, application and generalization of acquired experiences.

The Academic course was represented by fourteen private schools and one public school. The Academic-Vocational course was assigned to one private school and 39 public schools. The Academic-Vocational-Non-Academic course was inadequately provided by six public schools and no private school. The committee believes that the abilities, needs, interests, and other characteristics of the secondary school student, whether these be biological or physiological in nature, must be considered by the school and due recognition be given to the possibility for growth when standards for graduation are considered. Just as individuals differ so must school programs and school objectives and standards vary if the school is to serve well its

pupils and the community of which it is a part. Perhaps the most outstanding fact discovered from this study was that college requirements still dominate the curricula in the secondary school, tend to be standardized, and emphasize time spent in formal study and class attendance.

Two encouraging attitudes were obtained from principals. The following quotation is from one of them:

"You will notice that we offer a number of different curricula. Standards in each of these curricula vary. It would be extremely difficult, however, to express these variations in precise terms. They grow partly out of the differences in the needs of the various curricula and the interests of the children in the curricula and partly out of different ability levels which the various groups have.

"In certain courses we have definitely objective standards. For instance, in typewriting a student, to receive credit for the first year's work, must be able to type twenty-five words per minute with a minimum of errors and in the second year's work in typewriting he must be able to do forty words per minute with a certain number of errors set up in the regulation. We are also making use of the Educational Records Bureau tests. It is entirely possible that the day may come when these tests may be used to help set specific objective graduation standards in certain fields at least.

"It is, of course, extremely difficult to try to standardize matters that are so intangible as student abilities and achievements because not all these achievements are in the strictly academic field. As a matter of fact, we are more and more beginning to realize that in many ways academic achievement is a means and not an end in itself."

The most practical attempt to meet the need of the non-academic student was explained in another letter from a public school principal:

"We also offer the opportunity curriculum for those pupils of low mentality or those who are weak in one or more subjects. Pupils remain in this group, in which they receive careful individual attention, until such time as the teacher thinks them able to carry on their work in a regular class. Some pupils will, of course, never be able to leave this group. A certificate of attendance is granted such individuals at the end of three years; this certificate stating in what fields, if any, the student excels. This certificate is not considered a diploma. Each pupil in this curriculum receives a report card at regular intervals, but he never receives a failing grade. The marks that we use are: a large S, which means that the pupil has made sufficient progress to warrant his admission to regular classes; a small s, which means that the pupil is making progress but is not yet able to carry on regular work; and an I, which means that the pupil is making very little progress."

On October 28, 1937, a conference between representatives from colleges and secondary schools met in Harrisburg, Pennsylvania, for the purpose of considering secondary school graduation standards. The State Department of Public Instruction offered a set of standards which brought forth much debate and difference of opinion between the college and secondary-school authorities, and the meeting closed without any definite decisions having been reached. The standards as suggested by the Pennsylvania State Department of Public Instruction are here given in order that the trend in standards in Pennsylvania's secondary schools may be better understood.

SUGGESTED SECONDARY-SCHOOL GRADUATION STANDARDS

I. Standards Arising from School Organization

A. Graduation from a public secondary school shall be based upon the achievement of three years of work in the senior high school comprising the 10th, 11th, and 12th years in any type of school organization.

B. Admission to the senior high school be based upon achievement in the junior high school comprising the 7th, 8th, and 9th years, or their equivalent, in any type of school organization.

II. Standards Arising from Program of Studies

A. The program of studies shall consist of curriculums and courses of study as are provided for by law and as are approved by the State Council of Education or by the Department of Public Instruction acting under the authority of the law or the Council.

B. Within the program of studies offered in any senior high school, graduation requirements shall be expressed in terms of three-unit sequences, two-unit sequences, and single units.

C. A minimum of thirteen units in the 10th, 11th, and 12th years shall be required for graduation. Of these thirteen units, nine shall be satisfied by sequence, including one three-unit sequence.

D. Two units of English shall be required. Three units are recommended.

E. Two units of social studies shall be required. One unit shall be either United States history or Problems of Democracy.

F. A minimum in health and physical education of one hundred twenty minutes per week for the entire secondary school period shall be required. One-third unit credit per year shall be given for this work.

G. A maximum of two units of work earned in courses approved for less than one-half unit per year may be permitted as part of the thirteen units specified.

H. Clubs and extra-class activities which may be required in any school shall be in addition to the thirteen units specified.

III. Standards Arising from Unit Measures

A. A unit of work shall be a minimum of two hundred minutes per week for a period of thirty-six weeks, or its equivalent, of classroom work which presumes additional reading and study.

B. A unit of combined classroom and laboratory work shall be a minimum of two hundred fifty minutes per week for a period of thirty-six weeks.

C. Work of a strictly laboratory nature shall be counted as having half the unit value of classroom work.

IV. Suggestions to Colleges on Admission Standards

A. Colleges are requested to consider the admission of students on the basis of satisfactory work in the senior high school comprising the 10th, 11th, and 12th years.

B. Colleges are requested to consider expressing their requirements in English in terms of one unit for each year of study in the secondary school.

From the study of the limited data, the committee obtained two impressions:

1. In spite of the agitation for revised curricula so as to take care of the needs of all students, the traditional formal courses of studies predominate the school curricula, and standards of achievement in these formal studies are expressed in Carnegie credits or points that cover the same meaning.

2. Although cognizance was given to the presence of the non-academic and superior students in the schools, standards for graduation were not altered sufficiently so as to provide adequate programs in the school for the different ability groups.

The committee at this point in its study follows the opinion that both the needs of the pupil and the community should determine the curriculum. The employment agencies and activities of the community should be consulted in order to determine what is expected of the school and its finished

product. With this in mind, data were secured from a committee of York High-School teachers, namely, Miss M. Keeley, Miss E. Englar, Miss D. Gulden, Miss S. McDonald, Miss M. Altland, Mr. G. Kauffman, and Mr. B. Williams (Chairman) who made a survey of the industries, manufacturing plants and other places in the community that employ a large number of graduates from technical and vocational schools as well as high schools. The attempt was made to get definite statements on what a high-school graduate should be able to do, that is, what standard for graduation should be set by the employment agencies in the community were this opportunity given them.

The committee from the York High School visited nine manufacturing plants ranging in number of employees from a few hundred to approximately 2000. Managers of business establishments consisting of five and ten cent stores, department stores, a clothing store, and chain grocery stores were interviewed. Two bank presidents, two utility officials, and one hotel manager were questioned by the committee.

In every instance the members of the committee were cordially received and there was evidence of a feeling of interest and warmth on the part of those who were approached. The York Manufacturing Association showed keen interest in and expressed its unqualified approval of the Industrial curriculum of the high school. The chairman of the committee, Mr. Williams, was invited to attend the next meeting of the Educational Committee of the Association. The York Engineering Society, York Manufacturers Association, and the Chamber of Commerce have for years offered annual prizes to secondary students who attend both the York High School and the York Collegiate Institute-York County Academy. The willingness of all industries and businesses to cooperate in this study, was very encouraging.

In answer to the question, "If any boy or girl applies for a position and says he is a high-school graduate, what would you expect of him?" many replies were the same in meaning and were reiterations of the seven cardinal principles expressed so as to apply to the specific needs of the community agency under consideration.

The industrial plants favored the boy who showed a mechanical turn of mind and who, likewise, had executive ability. The business establishments were interested more in personality and character traits, neat appearance, and salesmanship ability. All agreed that the boy or girl should know very nearly what he wants to do when he makes application for a job.

One plant expressed the opinion that the old type foreman is passé and the demand is now for one who must serve as a buffer between the superintendent and the men under him. He must be capable of interpreting the policy of the plant, and to understand and explain the mechanics involved under his jurisdiction.

Some other replies are here given without further comment.

1. "He should have a knowledge of how to sell himself."
2. "He should have the ability to express himself well."
3. "He should be able to make decisions."
4. "Better citizens will make better workmen."
5. "He should have the ability to separate facts from near facts."
6. "He should be able to read the newspapers intelligently."
7. "He should have a sense of responsibility."
8. "He should desire to work."
9. "He should recognize authority."
10. "He should possess a spirit of cooperation."
11. "Honesty is the deciding factor in keeping a position."
12. "He must be able to pass a test in arithmetic involving proportions and fractions."
13. "He must have a good personality."
14. "He should be able to spell and speak good English."
15. "He must be able to manage both work and the social side of life."
16. "He should know how to take care of spare time."
17. "He should know how to fill out application blanks intelligently."
18. "He should have patience to await results."
19. "He should have the courage to question methods and seek better ways of doing things."
20. "He should know how to count."

The personnel manager of the York Ice and Machine Corporation, Mr. Becker, was keenly interested in the study and offered invaluable suggestions and comments. He employs a system of records by which he is acquainted with the home conditions, interests and abilities of his employees, totaling over 1000 individuals. His answer was:

1. What does the boy want to do?
2. The diploma should tell something about the pupil.
3. Standards should be set up that are similar in degree to those set up by colleges. That is, can the boy or girl
   a. Read newspapers intelligently? What does he read?
   b. Is he a good citizen?

c. Has he had basic courses for what he would like to do?

d. If he is going to be a leader, he must understand the policies of the plant and be able to interpret them to the men. He should have a good course in public speaking.

e. Has he a sense of responsibility?

f. Will he cooperate?

After each interview the committee realized that although no dissatisfaction with the secondary school system had been evident, the employing agency did want to know more than the fact that the boy or girl is a graduate from a secondary school. Seldom is the boy required to get a transcript of credits from the school in order to secure a position. Certainly the customary type of diploma which reads, "This is to certify that John Brown has completed the Course of Study as prescribed by the Board of Education and is therefore entitled to this Diploma. In testimony whereof we hereunto set our hands and seal at ____ Pennsylvania, this day of ____ A. D. 1938," does not assist either the student or the employment agency in coming to any agreement.

The two committees agree that the secondary schools should consider issuing differentiated diplomas in order that a better picture of progress made and an indication of the ability of the student to do certain things will be possible. Only through the keeping of accumulated records of students, the functioning of an efficient guidance program and new emphasis placed upon certain aspects of the school curricula can this be assured.

The committee noted that each school recognized the importance of good health and proper physical development by specific requirements in physical education. English was the other subject required by all schools for graduation. From the limited study made and in light of data obtained, the committee recommends:

1. That an adequate guidance program be instituted that keeps in close touch with the demands upon the school by the community into which the graduates will enter.

2. That a greater emphasis be placed upon the development of the means of expression, both oral and written, and that this opportunity be afforded every pupil in the secondary school.

3. That graduates be given differentiated diplomas so that both students and employment agencies may be given information that will facilitate

proper adjustment to the obligations imposed upon the graduates by the community.

4. That the schools seek full development of those personality traits in all pupils that in any way will increase the possibility for success, happiness, and contributions toward a better citizenry.

Finally, the committee offers a sample differentiated diploma that represents an accumulated record of the progress of the graduate:

_____HIGH SCHOOL

This certifies that _____ has been for four years a student in _____ and during this period of study has been enrolled in the Commercial Course, the objectives of which are for useful membership in society and for office and other business work of a clerical nature.

Has completed satisfactorily the subject units indicate on the opposite page, comprising a part of the full requirements of this course.

In recognition thereof this Limited Certificate of Graduation is hereby awarded at _____ this _____ day of June, 19____.

_____ _____

Superintendent *Principal*

CERTIFICATE OF SCHOOL CREDITS

The figures entered indicate the number of years the pupil has successfully studied, or pursued, the respective subject-units or activities.

Science
1 General Science
1 Biology
0 Chemistry

Mathematics
1 Algebra
1 Plane Geometry

Aesthetics
2 Music Appreciation

Other Subject Units
2 English
1 Spanish
1 Salesmanship

Special Curricular Activities 17 Total
2 Art
4 Glee Club, etc.

Extra Curricular Activities
2 Baseball
1 Debating
1 Dramatics
School paper, etc.

Social Studies
1 Ancient History
1 American History
1 Civics

Commercial Subjects
2 Typewriting
1 Bookkeeping

Practical Arts
1 Home Economics

A STUDY OF TYPEWRITING ACHIEVEMENT IN THREE HIGH SCHOOLS

LOUISE GREEN
Bowie High School
El Paso, Texas

Editor's note: Teachers have been urged to keep records and evaluate their efforts as teachers. The study herein reported illustrates a type of study open to teachers in almost all areas of learning and pupil experience.

IN ORDER to measure the actual development of the typewriting students through four semesters of training in the El Paso, Texas, public high schools, records were kept of both speed and errors made by each typewriting student on the weekly speed tests for a period of eighteen weeks in the spring semester of 1937–1938. By a study of the records, definite standards for both speed and errors may be set up, the effect of various types of drills may be measured, and teaching procedures may be evaluated. Previously, arbitrary standards for speed and errors had been set up for each week in all four semesters. The questions arose: Based upon actual performance, are these standards being met by the students? Do typewriting students progress in speed at the rate of one word per week? At what stages are plateaus reached and what can be done to avoid or to eliminate these plateaus?

There are three public secondary schools, Austin, Bowie, and El Paso, in the El Paso public school system, each of which offers four semesters of typewriting. No attempt has been made to compare the achievement of the three schools. The regular course of study of the school system was followed by each of the schools. In the first semester skill in the operation of the typewriter is taught, in the second simple business letters and business forms are given, but in both semesters stress is placed on the development of speed and accuracy in the operation of the machine. In the third and fourth semesters less drill is given and office typing is taught. More attention is paid to the teaching of business forms than to the development of speed.

These records show the results of the teaching of ten experienced typewriting teachers, seven of whom hold bachelor's degrees and three who hold master's degrees. Two of these teachers were men, and eight, women.

Due to the geographical location of El Paso, a large percentage of the population is Spanish–American. Forty-nine and eight-tenths per cent of the students in the first semester of typewriting were Spanish–American, 26.5 per cent in the second, 61 per cent in the third, and 47 per cent in the fourth.

Not more than three pupils of several other nationalities were in the group. Classification of students ranged from tenth to twelfth grades, and ages, from thirteen to nineteen years.

Tables I and II show the number of students, range, median, mean, and standard deviation for speed and errors, respectively, for the first semester of typewriting over a period of eleven weeks. Short accuracy tests, ranging from one to five minutes, are given during the first six weeks, but speed is not calculated. Speed tests of five minutes begin the seventh week and the

TABLE I

SPEED DEVELOPMENT IN THE FIRST SEMESTER OF TYPEWRITING

Week	Number	Range	Median	Mean	SD
8	255	0—38	11.4	12.0	6.72
9	256	0—41	12.6	13.3	5.27
10	227	0—46	14.4	15.1	7.39
11	223	0—47	15.9	16.2	6.99
12	257	0—38	16.4	16.6	5.21
13	253	0—54	17.2	16.7	6.42
14	253	0—36	17.3	17.8	6.99
15	251	0—42	18.5	18.9	6.96
16	245	1—41	19.3	19.5	6.15
17	248	2—42	20.1	20.7	6.22
18	146	6—49	21.5	21.9	6.26

TABLE II

TOTAL ERRORS IN THE FIRST SEMESTER OF TYPEWRITING

Week	Number	Range	Median	Mean	SD
8	255	0—11	2.0	2.4	2.01
9	256	0—11	2.4	2.9	2.29
10	227	0—12	2.3	2.8	2.20
11	223	0—18	3.8	4.3	3.24
12	257	0—17	3.9	4.8	3.42
13	253	0—21	4.1	5.0	3.52
14	253	0—27	4.7	5.5	4.32
15	251	0—21	5.7	5.5	3.94
16	245	0—18	5.6	5.5	3.40
17	248	0—21	4.1	4.8	3.67
18	146	0—17	4.3	4.9	3.40

time is increased one minute each week until the tests become fifteen minutes in length. All papers are scored according to the International Contest Rules.

The number of cases involved in this investigation of beginning typewriting is sufficient to make the results significant. Because of drop-outs, transfers, and absentees the number ranges from 223 to 257 during the first ten weeks. Due to the fact that final examinations, which come the eighteenth week, were in some cases other than speed tests, there were only 146 cases reported the eighteenth week. This smaller number, however, shows the same degree of progress as that made in the other weeks.

The speed increased steadily from twelve mean words to twenty-one and nine-tenths words per minute, or approximately ten words per minute in the eleven weeks. In no instance did the mean speed fail to increase each week, although there was an increase of only one-tenth word per minute in the thirteenth week over the twelfth week. The standard deviation remained fairly constant, indicating a rather steady development of the group. The standard which had been set up for a passing grade called for an increase of ten words per minute during the twelve weeks of training, but it began at eight words and increased to eighteen, showing that it was practically three words per minute too low for each week.

Errors were calculated as total number on the tests rather than errors per minute. Naturally, as time and speed increase, errors increase. Although the time increased from five minutes to fifteen minutes and the mean speed from twelve words to approximately twenty-two words per minute, the number of errors increased only three and one-tenth per test. In an analysis of the errors made by 100 of the students for the eleven weeks, the writer found that in practically all the cases where more than ten errors were made, they were omissions of words rather than typographical errors. The writer has also found that the Spanish–American students are easily influenced by outside conditions and that upon windy or cloudy days, errors tend to increase, which naturally decreases speed.

With an EC of five and three-tenths for speed, and one and eight-tenths for errors, the differences between the first and last weeks in both speed and errors are significant.

Tables III and IV give the weeks, number of cases, range, median, mean, and standard deviation for speed and errors, respectively, in the second semester of typewriting. The number of students range from 229 to 339 because the records were incomplete for some weeks. There are no records for the twelfth and eighteenth weeks since speed tests were not given as six weeks and final examinations.

Although the mean speed increases from twenty and four-tenths words per minute to thirty-two and six-tenths words during the period, the increase is not as steady week by week as in the first semester. Plateaus of two to three weeks duration are reached in this semester, probably because attention is divided as simple business forms are introduced in this semester.

A few pupils who have done well in regular class work in the first semester of typewriting, but because of nervousness "go to pieces" on tests

TABLE III

SPEED DEVELOPMENT IN THE SECOND SEMESTER OF TYPEWRITING

Week	Number	Range	Median	Mean	SD
2	229	0—44	19.6	20.4	7.40
3	309	2—50	21.7	22.1	7.90
4	343	0—48	22.3	22.3	7.40
5	310	0—44	22.3	22.4	6.35
6	243	9—47	24.5	23.2	6.04
7	329	0—47	24.2	24.4	6.60
8	339	0—50	24.6	24.8	7.85
9	341	7—53	25.2	25.5	7.15
10	282	3—51	25.5	25.1	8.00
11	266	13—54	26.8	27.3	7.50
12			No Report		
13	237	2—59	27.0	27.6	7.00
14	326	6—62	27.8	28.1	8.00
15	307	8—59	28.6	28.9	7.60
16	294	9—60	30.6	31.9	8.10
17	267	0—79	30.8	32.6	7.70

TABLE IV

ERRORS IN THE SECOND SEMESTER OF TYPEWRITING

Week	Number	Range	Median	Mean	SD
2	229	0—28	5.9	5.7	5.45
3	309	0—33	6.3	8.8	5.63
4	343	0—23	7.7	8.7	5.25
5	310	0—46	7.4	8.2	6.15
6	243	0—24	6.1	6.9	3.66
7	329	0—29	8.5	9.6	5.40
8	339	0—34	9.2	10.3	6.15
9	341	0—31	9.3	9.8	5.59
10	282	0—54	9.8	11.1	6.90
11	266	0—41	7.7	8.4	5.40
12			No Report		
13	237	0—34	7.8	8.8	6.80
14	326	0—37	7.6	8.8	5.90
15	307	0—30	7.2	8.0	5.35
16	294	0—59	7.3	8.4	4.19
17	267	0—21	6.6	6.9	4.11

are promoted to the second semester. For this reason zero scores, usually caused by omission of words, still persist in the second semester. These pupils, however, do not go into the advanced typewriting classes.

Both range and standard deviations show wider variations, indicating individual development. Nevertheless, the group progresses each week with the exception of the tenth week, which shows a retardation of four-tenths words per minute. The sixteenth week shows an increase of three words per minute over the fifteenth week. As in the case of the first semester, the standard set is too low, since it begins at nineteen words per minute and increases to thirty words per minute.

The EC for this semester is 6.48, showing that there is a significant difference between the second and the seventeenth weeks.

The mean number of errors for this semester is greater than any other semester. It would be interesting to know whether this condition exists gen-

erally or for this particular group of students only. There is also a greater difference between weeks, particularly the first eleven weeks. Standard deviations range from three and six-tenths to six and nine-tenths, which shows that the individual students are drawing farther away from the mean.

In Tables V and VI, the weeks, number of students, range, median, mean, and standard deviation for both speed and errors, respectively, are shown for the third semester of typewriting. The number of cases range from fifty-nine to one hundred and twenty-three. In some classes speed tests were not given the twelfth week, which accounts for the smaller number of cases in this week.

Probably because emphasis is placed upon office typewriting and less drill is given and because third and fourth semester students are taught together, the increase in mean speed in the third semester is only six and eight-tenths words per minute for the entire period. The greatest increase comes

TABLE V

SPEED DEVELOPMENT IN THE THIRD SEMESTER OF TYPEWRITING

Week	Number	Range	Median	Mean	SD
2	123	20—61	30.6	31.4	7.55
3	91	0—55	30.7	31.2	8.58
4	90	5—62	32.4	32.4	8.36
5	89	14—54	31.5	31.6	7.06
6	78	12—58	32.9	33.3	8.31
7	91	17—56	31.4	32.5	7.44
8	102	17—55	32.9	32.8	8.08
9	102	12—59	33.4	33.1	7.93
10	100	15—55	33.7	33.6	8.13
11	88	15—59	33.9	34.3	7.83
12	59	18—49	32.9	32.6	8.34
13	99	22—62	34.1	34.7	7.65
14	99	18—58	34.1	34.2	6.73
15	99	17—62	35.0	35.3	7.61
16	97	17—63	35.1	35.6	7.30
17	93	21—53	37.6	38.2	7.31

TABLE VI

ERRORS IN THE THIRD SEMESTER OF TYPEWRITING

Week	Number	Range	Median	Mean	SD
2	123	0—18	6.5	6.7	3.95
3	91	0—33	6.1	7.6	5.45
4	90	0—33	6.8	7.5	5.40
5	89	0—19	6.3	6.7	4.20
6	78	1—20	5.8	6.4	4.30
7	91	1—22	6.9	7.4	4.92
8	102	0—23	6.6	6.9	4.66
9	102	0—22	6.2	7.1	5.25
10	100	0—24	6.4	7.5	5.60
11	88	1—22	6.9	6.6	4.73
12	59	0—22	5.4	6.2	4.40
13	99	1—24	6.9	7.3	4.43
14	99	0—32	6.4	6.8	4.52
15	99	0—23	6.9	7.5	4.78
16	97	0—22	6.7	7.2	4.25
17	93	0—19	5.3	5.9	3.92

in the seventeenth week, with approximately three words per minute over that of the sixteenth week. While speed in the first two semesters shows a steady increase week by week, it fluctuates in the third semester. Standard deviations in the third semester tend to be larger than in the two preceding semesters and ranges show a greater deviation of the individual students from the average. According to the actual achievement attained by the students, the standard which calls for a ten word increase during the semester, is too high. The students do not progress at the rate of one word per week as indicated in the standard.

The EC, which is 2.42, while still showing a positive significance, is 4.06 less than in the second semester.

Errors tend to become constant, the greatest difference between any two weeks being two and three-tenths errors. There is less tendency to draw away from the average, even though a few individual cases show as high as thirty-four errors on one test. The difference in errors is rather insignificant as shown by the EC of .53.

Weeks, number of cases, range, median, mean, and standard deviation for speed and errors in the fourth semester of typewriting are represented in Tables VII and VIII, respectively. There is a great decrease in the number of cases as they range from forty-eight to sixty-three. Usually only those students who expect to use typewriting as a means of making a living take the advanced course. It would seem that because of the fewer number of cases in the fourth semester that part of the superiority of this semester over the third would be due to selection. Upon a study of the individual students, however, it was found that the pupils who continued the advanced course were not necessarily the best typewriting students.

The increase in speed for the entire seventeen weeks is only seven mean words per minute and the fluctuation from week to week is greater than any other semester. For the first ten weeks the mean speed ranges from thirty-nine and five-tenths words per minute to forty-one and nine-tenths words, with the fourth, sixth, and tenth weeks having the same mean speed. Only about ten minutes of the class period is given over to speed developing drills and since both third and fourth semesters are in the same classes, the drills for one class would not be suitable for the other. This may account in part for the ten week plateau in this fourth semester. The last four weeks show an increase each week, with the largest increase, three and three-tenths words per minute in the seventeenth week. Again as in the third semester, the

TABLE VII

SPEED DEVELOPMENT IN THE FOURTH SEMESTER OF TYPEWRITING

Week	Number	Range	Median	Mean	SD
2	59	27—60	41.0	40.6	7.35
3	60	27—59	37.9	39.5	7.70
4	58	17—67	41.0	41.9	7.90
5	58	20—52	40.5	40.0	6.20
6	54	31—62	41.7	41.9	6.90
7	55	29—54	41.1	41.2	6.69
8	61	20—54	41.1	40.6	6.26
9	60	34—62	41.3	40.3	6.41
10	61	23—63	41.5	41.9	7.79
11	61	26—65	42.9	42.9	7.80
12			No Report		
13	62	25—67	43.1	43.1	8.39
14	62	32—59	42.3	42.2	6.58
15	63	34—60	43.2	43.2	6.80
16	63	22—63	44.5	44.3	8.45
17	48	30—65	46.6	47.6	7.10

TABLE VIII

ERRORS IN THE FOURTH SEMESTER OF TYPEWRITING

Week	Number	Range	Median	Mean	SD
2	59	0—19	6.2	7.1	4.05
3	60	1—18	7.4	7.6	3.73
4	58	0—22	6.7	6.9	4.10
5	58	0—18	7.1	7.5	4.45
6	54	0—18	6.7	6.9	3.40
7	55	1—20	6.1	6.6	4.25
8	61	0—19	7.3	7.7	4.60
9	60	0—17	6.9	7.1	4.13
10	61	0—20	7.6	8.4	4.56
11	61	0—17	6.0	6.8	4.82
12			No Report		
13	62	0—23	7.2	7.8	5.10
14	62	0—20	7.1	7.6	4.45
15	63	0—19	7.1	7.4	4.20
16	63	0—22	7.0	7.7	5.02
17	48	0—29	5.9	6.8	5.20

standard set is too high as it goes from forty words the first week to fifty the eighteenth.

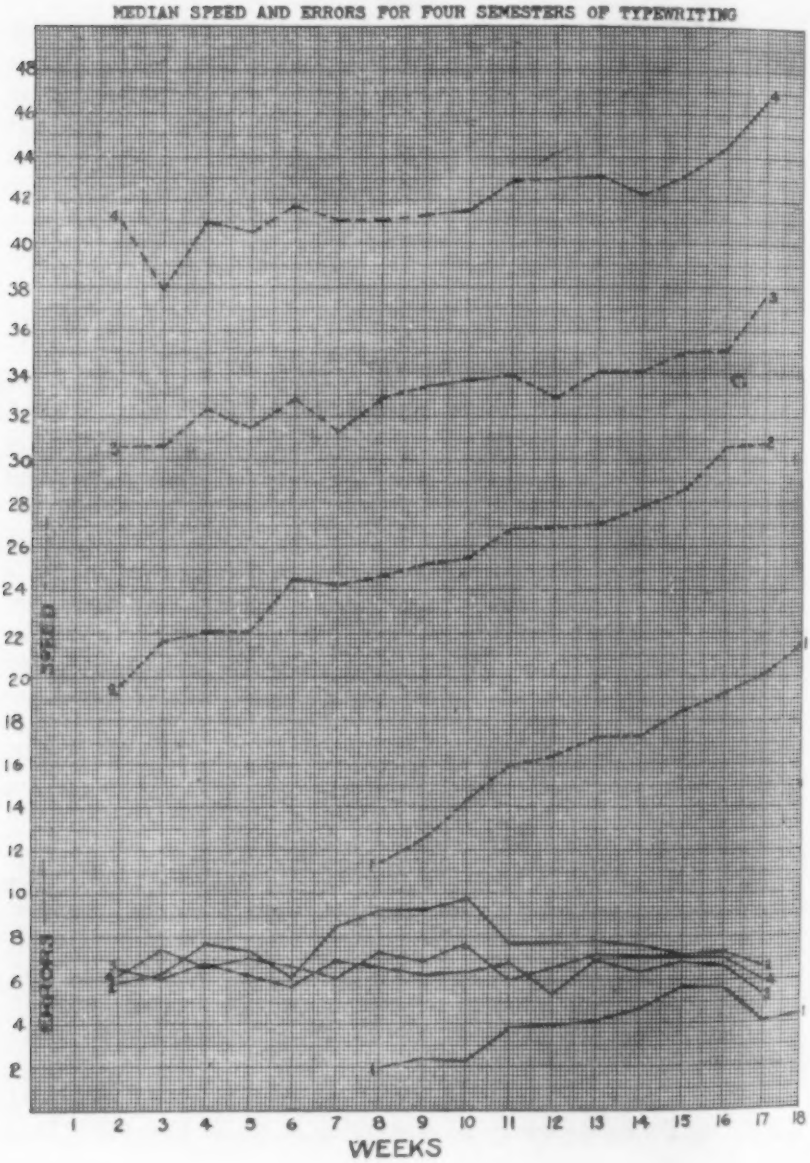
Although the EC, 1.85, is smaller than in any other semester, the difference between the first and last weeks is important.

The mean number of errors is approximately constant for this fourth semester, showing that development in accuracy tends to stop in the second semester. The SD is also fairly constant. In both the third and fourth semesters, the total number of errors allowed in the standard is eight on the fifteen minute tests. Only in the tenth week does the mean reach or exceed this number. The difference between the first and last weeks is unimportant as the EC is only .01.

Figure 1 gives a complete picture of the development of speed and accuracy for the four semesters of typewriting in the El Paso public high

Figure 1

MEDIAN SPEED AND ERRORS FOR FOUR SEMESTERS OF TYPEWRITING



schools. The median speeds and errors, week by week, are shown on this graph.

In the first two semesters of typewriting, there is a steady development in speed from week to week, with an increase of nine and nine-tenths words per minute for the eleven weeks in the first semester. Short plateaus are reached in the second semester, but the development in speed is fairly steady. The increase is twelve and two-tenths mean words per minute over the period of sixteen weeks. The increase in speed in both the third and fourth semesters for the sixteen weeks is seven mean words. Speed tends to fluctuate from week to week in these two semesters. The greatest increase in both cases comes in the seventeenth week.

Errors increase as the time and speed increase in the first semester. The largest number of errors per test are found in the second semester. After the eleventh week, the number tends to become constant until the seventeenth week, which shows a decrease of approximately two mean errors. Errors reach a constancy in the third and fourth semesters, showing that in these semesters students do not develop in accuracy.

Accuracy should be stressed particularly in the second semester of typewriting as the greatest number of errors are made in this semester; errors should be analyzed and individual corrective drills given. Since it has been found that excessive errors are caused by omission of words, concentration drills should also be given in this semester. It is recommended that third and fourth semester classes be separated as neither can be greatly benefitted by the speed developing drills when they are together. It is also recommended that more attention be given to the development of speed in these two semesters.

EDITORIAL

WE PAUSE TO CONSIDER

THE occasion of American Education Week with its theme, "Education for the Common Defense," calls for consideration of the situation in which civilization—and research—finds itself. As workers in the field of scientific inquiry we are greatly concerned over this world situation, for our work can be carried on only under certain conditions. The pursuit of our goals requires freedom of thought as well as freedom from ordinary labors.

Many times have earlier generations of research workers seen the results of their labors pass into oblivion because of destructive forces. We recall the barbarizing of Greece and Rome, the burning of the library at Alexandria, the flight of knowledge from Bagdad, the great middle age intolerance, the destruction of the Aztecs. For the past three hundred years the producers of knowledge have largely been spared these political ravages. Now we see again the ugly spectre of heedless power, and the determination of truth by political declaration rather than by conscientious, competent study. We know that neither research nor the results of research can survive in that atmosphere; so we pause in our work to consider: to take note of the past and the present; to work out our own position; and to see what we can learn.

As students of the history of human thought, interested in stable progress, we are apprehensive. Because we are intellectual workers we believe in reason rather than force. But when the very existence of the pursuits to which we have devoted our lives is threatened, we will give some attention to the presence and nature of those forces which threaten. We do not believe in war; but neither do we believe in being destroyed or in having the world made insufferable for those of our kind. We will not pass the present situation by with the statement that it is not of our making and therefore none of our concern.

Political bondage is as dark as the bondage of ignorance. We believe that the truth will make men free; but we also know that it takes free men to discover and apply the truth. We love our work; we therefore appreciate

the conditions which make our work possible, and we will do at least a citizen's part toward preserving and improving those conditions. We will make some effort to modify our accustomed detachment from the affairs of the current world, and give thought to the form of our greatest possible service to our society—both as citizens and as research workers.

There may be lessons in the present world upheaval from which we can profit. For example, we note the baffling ingenuity with which the Nazi leaders departed from tradition and found new means for newly conceived purposes. They studied weaknesses, past and present; they sought new approaches; they outwitted precedents. The dramatic events of recent world history signalize the need for occasionally overhauling the foundation concepts which guide one's activities.

We might ask ourselves first whether we are already showing signs of growing hidebound in traditions which were early accepted in our work. We are charged with the discovery of truth. But truth has many dimensions, and calls for many approaches. The very complexity of our task suggests the appropriateness of giving considerable attention to the discovery of a wide variety of methods, and of testing out continually a stream of fresh ideas for the solving of problems. Any group is in danger from within—from the limitations of its own ideas, and the restrictions of its self-imposed standards. Already we have reached ceilings in some areas, stalemates in others. We must be on guard against a natural preference for the intellectual security of following precedent; and of resting upon compliance with the canons of objectivity, reliability, and validity rather than seeking vigorous approaches to problems that need solution.

We need also to examine the emphasis in the selection of problems for study. We realize that not all truth lurks in the laboratory; much of it surges in the field—in the great arena of personal and societal forces, where ideologies and interests vie with one another for favor and advantage. Yet we do not commonly seek dynamic problems in these larger areas; we cannot state and solve them with nicety. We prefer phenomena that are static, or conveniently repetitive; we shy away from grappling with the rapidly shifting scene of normal life, and from seeking uniformities that are difficult to define. We are afraid of these things; we should be more afraid of the "Maginot Line complex"—confidence in what has been done rather than zest for what is yet to be undertaken.

It is sometimes helpful to recognize that the work of our generation is not final, and that we do not carry responsibility for the last word. We only approximate truth. It is possible that we will make more useful approximations, both to the future of science and to contemporary education, by attempting fresh approaches to problems that are vital, even if baffling. We will not relinquish essential criteria of work; we will seek not to embarrass our group by flimsy effort. But neither will we overlook opportunities. In a world of rapidly changing values, we will search our own. We will not easily accept unnecessary restraints upon ingenuity. And we will value research effort in terms of its dynamic worth as much as for its proximity to some particular facet of truth. We will view our efforts, not as though we were approaching the end of research, but as though we were just beginning. Having a long way to go, there is yet much room for freedom, both as to choice of problem and as to method.

Research workers must be men of vision even more than masters of technique. Leadership and vital service depend upon a constantly renewed perspective. We have among our number workers who are bold and courageous, who venture into new areas developing appropriate means as they proceed. We must not fail of encouragement for such persons, nor cloud our appreciation of what they contribute. Research is not well served by criteria which are ageless—except those which are stated in the most general terms. We observe at the present time that in many spheres of life sets of criteria which had proved internally acceptable have been rudely thrust into a larger perspective which reveals that much is wanting. We must not continue indefinitely to rely upon ideas that have served us in the past.

In this time of world strain, when weaknesses are forced into the open, we will pause to consider our work anew. And when we are asked, What have research workers to contribute to the struggle for the preservation and expansion of intellectual freedom, we may answer: We have a fresh vision, a fresh courage, and a determination to keep ourselves free in spirit, and our work strong and vigorous.

DOUGLAS E. SCATES,
Duke University.

REVIEWS

Address all communications relative to book reviews to Editor Kai Jensen, University of Wisconsin, Madison, Wisconsin.

MYERS, ALONZO F. and KIFER, LOUISE M. *Problems in Public School Supervision* (New York: Prentice–Hall Inc., 1939), pp. xii + 212. $2.00.

The volume Principles of Teaching by Thorndike which appeared in print in 1906 is said to be one of the first texts to include problems for study. The late S. C. Parker, in 1915, predicted that texts would increasingly include true problems as distinguished from mere questions on the text. He further predicted that separate problem manuals would appear to accompany given texts or even so constructed as to be useful with any good text in the field. Parker himself published what was probably the first problem book to accompany a college text.

Parker's predictions about problems in the text and problem manuals have been amply justified on the lower levels. Elementary and secondary subjects and fields now contain many such teaching aids. This innovation, like all other departures, is much slower in penetrating the college level.

The volume here reviewed is a valuable addition to the small number of problem manuals available on the college level. It is superior to most of these books, first, in the amount of detail given with each problem, and second, in the sub-questions accompanying each problem.

The book is divided into eighteen units, each of which contains from two to four problems, forty in all. The units refer to typical major functions or processes of supervision such as "Problems Relating to Teachers' Meetings and Conferences," "Problems Relating to the Organization for Supervision," "Induction and Guidance of Beginning Teachers," "Supervision in Relation to Superior Teachers," "Supervision in Relation to Weak and Inadequately Educated Teachers." The specific problems under these unit headings may be illustrated as follows: "Initiating an Activity Program in a School That Does Not Want It," "How Should a Music Supervisor Make the Transition from Traditional Supervision to Consultant Type of Service?", "Aiding Teachers in Diagnosing Pupil Difficulties in Arithmetic by Means of Tests."

Each problem is described in concrete, specific terms at the length of from two to four pages. A list of analytic questions follows designed to direct the student in probing the situation. A bibliography concludes each problem. A feature of the list of problems is that it is not designed to accompany any one text; it may be used with any standard text or syllabus in the field of supervision.

The problems are all practical. The statements could be improved materially in a few cases but the list as a whole is well stated and stimulating. The major functions are nearly all covered. Problems are omitted upon such topics as The

Evaluation of Educational Products, Studying and Evaluating the Curriculum, though there are a few that indirectly relate to that. Two others that are omitted are The Study and Evaluation of Supervision's Own Procedures, and the field of research and experimentation. However, the problems included should show most teachers how to construct others, not only on the units included but upon those omitted. This problem manual should prove of definite use to all who teach courses in supervision and also to many supervisors in service.

W. H. BURTON.

Harvard University

BAILEY, FRANCIS L. *A Planned Supply of Teachers for Vermont.* Contributions to Education No. 771 (New York: Bureau of Publications, Teachers College, Columbia University Press, 1939), pp. vi + 88. $1.60.

Estimates as to the number of new teachers needed annually for the Vermont elementary and secondary schools, respectively, were made for each year from 1938–1939 through 1941–42. These estimates were based upon carefully detailed analyses of the number of teaching positions and the number of graduates available for teaching in the state over a period of years with special reference to the years 1936–1937 and 1937–1938. The various factors which might affect the demand for teachers in Vermont were considered. Suggestions were made for relating supply to demand.

The author reports that "desirable enrollment quotas" are determined by the Director of Teacher Training cooperatively with representatives of the normal schools and colleges. It appears that an acceptance of these quotas is optional and it is not clearly shown how they affect students from outside of Vermont who prepare to teach in Vermont colleges but who do not wish to teach within the State. The work of the Vermont Teachers' Guidance Association which attempts to encourage students who show promise of good teaching calibre to enter the teaching profession is mentioned.

The reader gets a rather clear picture of the relationship of teaching supply to teaching demand in Vermont from the analytical report. Details of the means by which the supply may be brought into closer relationship to the demand are somewhat vague.

EARL W. ANDERSON.

Ohio State University

Research Abstracts and Bibliographies

Address all communications relative to research abstracts and bibliographies to A. S. Barr, University of Wisconsin, Madison, Wisconsin.

BULLETINS

BEERS, F. S. *Student Opinion of College Courses: The University System of Georgia 1937 and 1940* (Athens, Georgia: Examiners Office, University System of Georgia, September, 1940), 14 pp.

The author presents data from which he concludes that in the opinion of the college sophomores of Georgia the general education or survey courses are more popular, better in quality, and more difficult than non-survey courses.

BIXLER, HAROLD HENCH. *The Standard Elementary Spelling Scale* (Atlanta: Turner E. Smith & Co., 1940), 115 pp.

This spelling scale contains a list of 3679 words with tables indicating the percentage of pupils who can spell each word at each grade level from 2 to 8.

DALE, EDGAR, and VERNON, NORMA. *Propaganda Analysis: An Annotated Bibliography,* I, No. 2 (Columbus, Ohio: Bureau of Educational Research, Ohio State University, May, 1940), 29 pp.

The authors present an annotated bibliography of articles dealing with the teaching of propaganda analysis.

ELSBREE, WILLARD S., Chairman, et al. *Teacher Personnel,* The Review of Educational Research, X, No. 3 (Washington, D. C.: American Educational Research Association, National Education Association, June, 1940), pp. 177–297.

The authors review the research literature pertaining to teacher personnel for the three years ending December 1939.

GIVENS, WILLARD E., Secretary. *Progress in Rural Education,* National Education Association Research Bulletin, XVIII, No 4 (Washington, D. C.: Research Division, National Education Association, September, 1940), pp. 131–182.

This bulletin contains data on rural schools for the decade 1930 to 1940.

GREENLEAF, WALTER J. *80 New Books on Occupations* (Washington, D. C.: U. S. Office of Education, Federal Security Agency, August, 1940), 31 pp.

The author presents an annotated bibliography of books on occupations published during the period January 1939 to July 1940.

JACKSON, W. B. *Application of the Analysis of Variance and Covariance Method to Educational Problems,* Bulletin No. 11 (Toronto: Department of Educational Research, University of Toronto, 1940), 103 pp.

The statistical techniques of R. A. Fisher are applied by the author to educational research problems.

McQUISTAN, D. B., *Chairman. Report of the Advisory Committee on the General Principles Governing the Production of Educational Films,* Scottish Film Council and Scottish Educational Film Association (London: University of London Press, Ltd., 1940), 70 pp.

The Advisory Committee presents some general principles to be followed in the production of educational films and a list of subjects which may be used for such films.

MEAD, A. R., et al. *The Citrus Industry and Occupations in Florida* (Gainesville, Florida: National Youth Administration for Florida), 182 pp. Mimeographed.

The National Youth Administration for Florida presents occupational information about the citrus industry of Florida.

NEURATH, OTTO, and KLEINSCHMIDT, H. E. *Health Education by Isotype* (New York: American Public Health Association), 31 pp.

The authors describe the possible uses of Isotype as visual aids in health education.

OBERTEUFFER, D., et al. *The Development of Experimental Attitudes,* Educational Research Bulletin, XIX, No. 12 (Columbus, Ohio: College of Education, Ohio State University, September 11, 1940), pp. 335–362.

The authors discuss the development of experimental attitudes in the College of Education at Ohio State University.

ROHRBAUGH, LEWIS HENRY. *Vectors in Group Change* (Philadelphia: University of Pennsylvania, 1940), 85 pp.

In this dissertation the author suggests a way in which a sound and effective science of human relationships might be developed.

ROSE, MARY S., and BOSLEY, BERTLYN. *Feeding Our Teeth: A Nutrition Unit for the Third and Fourth Grades of the Elementary School* (New York: Bureau of Publications, Teachers College, Columbia University, 1940), 26 pp.

This unit consists of ten lessons of one-half hour each.

STENQUIST, JOHN L., Editor. *The Baltimore Program of Education for Pupils of Superior Ability,* Baltimore Bulletin of Education, XVIII, No. 1 (Baltimore: Bureau of Measurement, Statistics, and Research, September–October, 1940), 98 pp.

This issue of the Bulletin contains articles describing the attempts of the Baltimore schools to adjust the educational program to the needs of the children of superior ability.

TOWNES, MARY E. *Teaching With Motion Pictures: A Guide to Sources of Information and Materials,* Revised Edition (New York: Bureau of Publications, Teachers College, Columbia University, 1940), 29 pp.

This bulletin is designed to help those using motion pictures as a teaching aid but who are not familiar with the sources available for information and help.

WARNER, KENNETH O., Director. *Seattle Schools Discover the Region,* Know Your Northwest Series (Portland, Oregon: Northwest Regional Council, September, 1940), 29 pp.

This bulletin contains a description of the Seattle schools curriculum program in which the Pacific Northwest region is made a major center of study.

EDUCATIONAL ADMINISTRATION AND SUPERVISION

RICHEY, HERMAN G. "Reappraisal of the State School Systems of the Pre-Civil-War Period," *The Elementary School Journal*, XLI, No. 2 (October, 1940), pp. 118–129.

From an analysis of available educational statistics, the author concludes that the accomplishments of the so-called "public school revival" of the period preceding the Civil War have been overestimated and that the post-war period needs to be studied.

CURRICULA AND OBJECTIVES

DOLCH, E. W. "Sight Syllables Versus Letter Phonics," *The Elementary School Journal*, XLI, No. 1 (September, 1940), pp. 38–42.

The author presents data from which he concludes that more research is needed to determine what syllables should be taught in primary reading.

PETIT, DONALD D. "The Content of Junior High School Science," *School Science and Mathematics*, XL, No. 7 (October, 1940), pp. 643–654.

The author presents data from a study of junior high school science texts from which he concludes that there is little uniformity in the choice of units, topics, and concepts, and that the teacher is justified in organizing the seventh grade course to suit local and pupil needs.

WITTMANN, VERA E., and KAULFERS, WALTER V. "Continuance in College of High-School Foreign Language," *The School Review*, XLVIII, No. 8 (October, 1940), pp. 606–611.

The authors present the results of a study from which they conclude that few students who study language in high school continue to study the same language in college.

STATISTICS, MEASUREMENTS AND SCIENTIFIC TECHNIQUES

WASSON, ROY J. "Measuring Primary-Grade Children's Understanding of Home and Family Relationships," *The Elementary School Journal*, XLI, No. 2 (October, 1940), pp. 108–117.

From an investigation in which the individual-interview technique was used, the author concludes that when primary-grade children are provided with suitable experiences they can understand the meaning of their social relations with persons in their family group regardless of their level of general intelligence.

NEW TESTS

BAKER, HARRY J., and VOELKER, PAUL H. *Detroit Retail Selling Inventory* (Bloomington, Illinois: Public School Publishing Company).

The Inventory is designed for use in the selection of candidates for training courses in retailing and for the evaluation of candidates for employment who have not had previous training in retail courses.

COLE, LUELLA. *Guidance Examinations in the Fundamental Vocabulary* (Bloomington, Illinois: Public School Publishing Company), *English Composition Vocabulary Examinations*, 8 pp. *Arithmetic Vocabulary Examinations*, 12 pp.

These tests are designed to aid the teacher in presenting the technical vocabulary of English composition and arithmetic.

Research News and Communications

Address all research news and communications to Carter V. Good, Teachers College, University of Cincinnati, Cincinnati, Ohio.

Office of Education Projects.—Current studies of the United States Office of Education are as follows:

The Education of Handicapped Children.—Two cooperative projects under way are: (1) a study of educational problems and practices in schools for the mentally deficient in cooperation with the American Association for Mental Deficiency; and (2) a study of curriculums and other adjustments and practices concerned with the education of gifted children, in cooperation with a group of interested educational specialists, teachers, supervisors, and administrators. The first investigation, in part the result of a questionnaire study, will be completed May, 1941; the second, probably to be completed later in the same year, will include contributions from the several members of the group, coordinated and edited in the Office of Education.

Weekday Classes for Religious Education.—A study is being completed of the extent to which public schools release or dismiss pupils during school hours to attend weekway classes of religious education. Replies to an inquiry represent 70 percent of the 3,164 city and town school systems in places having populations of 2500 and more and 43 percent of the 3,500 county school systems from which the addresses of rural schools releasing pupils were obtained. All states are represented.

The study reports the number of school systems in rural schools and in cities of different population sizes which indicated that they now release pupils, that they have discontinued the practice, that they plan to initiate the program in the near future or that they have never released pupils. Current practices of 488 urban and rural schools which release pupils are described in relation to the years during which classes have been conducted, the number of weeks and number of days a week during the school year that classes are held, the elementary and high school grades releasing pupils and the proportion of pupils in regular attendance, the location of teaching centers and the major emphases and teaching techniques followed in the classes, the conditions under which credit toward graduation is granted to high school pupils for weekday class attendance, and the types of individual church or church council administration under which the classes operate.

A summary is included of the laws and regulations controlling the release of pupils for weekday religious education. The study focuses upon classes conducted *during school hours* and does not cover classes conducted outside of school time.

Student Aid in the Colleges.—A study has been made of the amount of student aid available at each of the more than 1500 colleges and universities through-

out the United States from the following six sources: (1) scholarships, (2) fellowships, (3) student loans, (4) grants in aid, (5) work for wages paid by the institution, and (6) work for wages paid by the N. Y. A. The study compares these various student aids among colleges of different forms of control, different sizes, and different geographical locations.

Relationship of State Officials to Higher Education.—A study has been made of the influences exerted by the governors or other state officers or state agencies in the handling of the finances of state institutions of higher education. This involves influences exerted at the time the budget is being prepared for presentation to the legislature and it includes also limitations placed upon institutions in the expenditure of money after it has been appropriated by the legislature.

As a part of the *National Survey of the Higher Education of Negroes*, two research projects are under way:

1. A study of the industrial and population characteristics of each of the 1300 counties of the South in their relation to such educational factors as the number of high schools, the number of colleges, the per cent of Negroes 14 to 17 years of age attending high school, the number of Negroes living in the county attending college, and the migration rate between 1920 and 1930. From this study it will be possible to indicate whatever relationship exists between economic and population factors and availability of educational facilities.

2. A variety of tests have been given to the seniors in 45 typical Negro colleges, and other tests are to be given to the freshmen of these same colleges at the opening of the fall semester. On the basis of these tests certain comparisons can be made, based on the characteristics of student bodies in the various colleges and on the change between freshman and senior ratings among these colleges. It will also be possible to compare the standing of these colleges with institutions for white students where the same tests have been given in previous years.

Accreditation Activities of State Departments of Education.—A study has been made of the activities carried on by state departments of education, state universities, and state college associations in the field of accreditment of institutions of higher education. The results of this inquiry are thrown against a background of accreditment problems experienced by national associations and regional associations engaged in accreditment.

Research Division, N.E.A.—The Division provides the members of the Association, its officers, committees, and departments a general research service consisting of informational, editorial, administrative, and consultative phases. In addition, the Division plans and executes a number of projects which originate in connection with its own program.

Letters of Inquiry.—Each week during the school year the Division answers from 150 to 200 letters of inquiry. These letters are written by classroom teachers, administrators, parents, and students. Every effort is made to provide pertinent research findings, practical publications, and current bibliographies.

Research Bulletins.—During the school year, 1939–40, the Division prepared five bulletins on the following topics:

September (1939), "Organizations Interested in International Relations"—a list of 174 agencies supplying publications and services of interest to teachers.

November (1939), "The Teacher Looks at Teacher Load"—a report of what nearly 4000 classroom teachers, cooperating through 188 local associations, believe to be the effects of teaching assignments and working conditions.

January (1940), "City Teachers: Their Preparation, Salaries, and Experience"—a detailed analysis of various factors associated with the biennial salary survey of urban school systems.

March (1940), "The Status of the Teaching Profession"—a brief review of the preparation, economic condition, tenure protection, retirement provisions, and other aspects of the professional status of elementary- and secondary-school teachers.

May (1940), "Analysis of Local Provisions for Teacher Retirement"—a summary of 65 local pension and retirement plans.

Plans are in progress for publications dealing with the problems of rural education, education of exceptional children, supervision of instruction, school finance, and the teaching of various areas of study.

Committee Reports.—During the year the Research Division has assisted in the technical work of committees of the Association and its departments. Among this year's activities have been the following:

Committee on Tenure.—Compiled a review of court decisions; prepared drafts of materials dealing with summer school attendance and the employment status of women.

Committee on Academic Freedom.—Advised on the possibility of preparing a statement of general policy.

Committee on Equal Opportunity.—Assisted in outlining a program of interpretation of problems in the general area of the Committee's assignment.

Committee on Credit Unions.—Helped to compile and edit information for a handbook on how to establish teacher credit unions.

Committee on International Relations.—Compiled a report of illustrations of how international relations are taught in secondary schools; issued two news letters.

Committee on Supply, Preparation, and Certification of Teachers.—Prepared a tentative summary of techniques used in the study of supply and demand problems in various states.

Committee on Cooperatives.—Coordinated activities leading to the preparation of a manuscript on the theory behind the cooperative movement.

Committee on Salaries.—Assisted in the preparation of a statement of principles involved in the making of teacher salary schedules.

Committee on Tax Education.—Advised on plans for the preparation of popular materials dealing with tax problems.

Joint Committee of the N. E. A. and A. L. A.—Initiated a survey of relationships between public schools and public libraries.

National Council on Teacher Retirement.—Compiled a summary of court decisions; initiated a study of the avocational interests of retired teachers.

Committee on the Certification of Superintendents of Schools.—Assisted this departmental committee of the American Association of School Administrators in issuing a report of case studies of twenty-six successful superintendents of schools.

Newly appointed committees will meet in the fall of 1940 to plan their activities for the school year, 1940–41.

Yearbooks.—For sixteen years the Division has helped in the preparation of departmental yearbooks. Many of these volumes have been useful to curriculum committees, study groups, and boards of education, as well as to individual members of the profession. The two publications issued during the school year of 1939–40 are the following:

1. *Enriching the Curriculum for the Elementary-School Child,* Department of Elementary School Principals, pp. 500.

2. *Safety Education,* American Association of School Administrators, pp. 544.

Early in 1940–41 the Division completed the editing of the volume, *Meeting Special Needs of the Individual Child.* This is the Nineteenth Yearbook of the Department of Elementary School Principals.

Yearbooks now being prepared deal with education for family life, health education, and language arts in the elementary school. In connection with these activities the Research Division supplies technical research counseling and statistical, editorial, and clerical services.

Cooperative Projects.—Jointly with the American Association of School Administrators the Research Division maintains a subscription service, the Educational Research Service. Through this channel approximately 450 school systems, universities, libraries, and teachers associations are provided with various publications and informational aids. During the year the Division has supervised the preparation of ten circulars dealing with topics such as salary schedule provisions for classroom teachers in cities above 30,000 in population, the relationships of school systems to council-manager plans of municipal government, aspects of school library administration, and the length of school sessions and class periods in public schools. The facilities of the Research Division are also drawn upon in answering letters received from subscribers.

With the aid of funds supplied by the Highway Education Board, the Division has successfully compiled several publications in the field of safety education. Of particular interest to administrators are two bulletins, *Checklist of Safety and Safety Education* and *Teacher Liability for Pupil Injuries.* Classroom teachers will find much helpful material in the following reports: *Visual Aids in Safety Education, Problems and Topics in Safety Instruction, Units in Safety Education: Grades I and II, Units in Safety Education: Grades III and IV,* and *Units in Safety Education: Grades V and VI.* Progress is being made on a list of dramatizations and instructional suggestions for secondary-school teachers.

Cooperative activites have continued durng the year with the American Association of Teachers Colleges in preparing a report on student personnel practices. Other studies on teacher-education problems are contemplated.

Miscellaneous.—Through its state school legislative reference service the Division supplies information and publications to more than 1000 local and state leaders. Materials circulated during the year dealt with finance, retirement, and tenure questions.

Each year the Division compiles a number of memoranda for officers of the Association, members of the staff, and local officers of teacher groups. Assistance has been given to many local salary committees. Counseling and information services were extended to teacher committees and executives of Kansas City

with regard to the Griffenhagen survey of that city. Members of the Division have served on staff committees and helped local and state education associations with such activities as convention programs and committee work.

The assistant directors of the Division now include: Richard R. Foster, Ivan A. Booker, and Hazel Davis. This statement was prepared by Frank W. Hubbard, recently appointed director of the Research Division. The former director, William G. Carr, is now associate secretary of the N. E. A. and continues as secretary of the Educational Policies Commission.

Secondary-School Principals.—The work of the National Association of Secondary-School Principals during the year 1939 and 1940 must be considered as a part of a long-range program for the improvement of the American high schools which the Association has been developing for several years.

The first step in this program was a study of the issues and objectives of secondary education by a body of eminent educators through the Orientation Committee, followed by a statement of conclusions published in 1936 and 1937 as the "Issues of Secondary Education" and the "Functions of Secondary Education." The second step, which has occupied a large part of the Association's energy and attention for three years, has been the organization of groups of principals and teachers throughout the nation to the end that sustained and systematic discussion of these issues and objectives might be achieved. The establishment and encouragement of these groups have been the responsibility of the Discussion Group Project of the Association, which has maintained a central office since July, 1937, at the headquarters of the National Education Association, Washington, D. C.

During this period of three years, an organization has been effected in each of the states, with the State Coordinator at the head. Under the Coordinator, there are Regional Directors who are responsible for forming the principals of each district into a group which meets regularly to discuss the problems of secondary education that seem most important and most urgent. In many of the states the principals are quite completely organized and local groups are operating effectively. In other states the results have been somewhat spotty, though in every state something has been done. The Discussion Group Project has furnished discussion guides based on the reports and recommendations of the Orientation Committee.

During the last year, the Association, acting through the Discussion Group Project, has undertaken to proceed from theory to practice. An effort has been made to discover where the objectives set forth in the reports of the Orientation Committee are being realized in actual practice. Principals have been asked to report practices which are particularly promising, in that they are in keeping with the philosophy formulated in the Orientation Committee's reports.

Reports have come from more than 600 schools; these promising practices have been abstracted and classified, and will be published as the October number of the *Bulletin* of the National Association of Secondary-School Principals. This report constitutes a climax of the recent work of the Association.

The fourth step undertaken by the National Association, one destined to occupy its attention for some time, is to obtain

an appraisal and an evaluation of the reported practices which appear on the surface most promising. This is the work of the Implementation Commission, appointed by the National Association of Secondary-School Principals, which has been in operation for about a year.

The Discussion Group Project, which has been operating in the headquarters of the National Education Association for three years, has been regarded as a temporary section of the Principals' organization, and beginning July 1, 1940, it was absorbed by the central office of the National Association of Secondary-School Principals, which has been moved from Chicago to Washington. The executive-secretaryship of the Secondary-School Principals is now under the leadership of Paul E. Elicker, former president of the Association and more recently principal of the Newton (Massachusetts) High School, who will direct the Discussion Group work, as well as the general business of the Association. This information was provided by Walter E. Myer, former director of the discussion project.

Occupational Adjustment Study.—During the past year the Implementation Committee of the National Association of Secondary School Principals has been engaged in a study of the occupational adjustment of non-college school-leavers. The objectives have been:

1. The development of a relatively simple but valid survey-plan which will be of aid to schools in deciding to what extent their pupils who have not gone on further with formal schooling make satisfactory occupational adjustments.

2. The discovery of techniques and practices which can be introduced to make more effective the occupational adjustment of pupils whose formal education will cease at graduation if not before.

The work of the full-time staff during the summer and early autumn of 1939 consisted of developing the criteria and instruments for surveying various aspects of the youths' school experiences and occupational adjustments. Three major instruments emerged: (1) a schedule for interviewing the youth, (2) a schedule for interviewing the employers, and (3) a combination form for recording data from the school records and for interviewing the youths' advisers while in school. Two forms, supplementary to the youth and employer interview schedules, were developed to enable interviewers to rate the youth on certain "ways of behaving" pertaining to three areas of adjustment: (1) planning for expected occupation, (2) appraisal of present job, and (3) adjustment to present job. Other instruments included: (1) a form for surveying the school, its organization, administration, offering, and personnel; (2) a form for a brief survey of the community and its resources; and (3) a form to use in summarizing the work of the youth-serving agencies in the community. Manuals were constructed for each of the major instruments, containing specific instructions for their use.

Six centers with easy access to New York City, whose high schools offered a wide diversity of school practices, were selected for trying out the procedures and instruments. A sample of the non-college school-leavers during the previous five years was selected for each of the six centers. The winter months of last year were spent in locating and interviewing these samples of school-leavers.

With nearly two hundred items of information collected for each youth, the

remainder of the year was consumed in making analyses, attempting to draw inferences, and in going back to the high schools to investigate apparent relationships between school practices and occupational adjustment. The immediate outgrowth of this work was the submission of confidential reports with recommendations to each of the participating schools and the writing of a general report, *Occupational Adjustment and the School*, which is to be published as the November issue of the *Bulletin* of the National Association of Secondary School Principals, containing a complete description of procedures and instruments, as well as a discussion of certain recommendations for school practice which grew out of the project.

As a result of the work of last year, *The Post-School Occupational Follow-up and Adjustment Service Plan* has evolved to meet the requirements of the first objective of the study. It is designed specifically for use by a busy high school principal and the materials consist of: (1) a follow-up record card designed for easy sorting, (2) a follow-up inventory to be sent to all school-leavers, (3) a follow-up youth interview schedule, (4) a follow-up employer interview schedule, and (5) a complete descriptive manual. An additional grant of funds from the General Education Board is making possible an experimental try-out of the plan in thirty to forty school systems throughout the country during the school year of 1940–41.

The director of the project is Edward Landy and the associate director is John R. Beery, the latter of whom prepared this progress report.

Commission on Teacher Education, American Council on Education.—During the academic year, 1939–40, the Commission's field program got definitely under way. In accordance with the terms of reference, major emphasis has not been placed upon extensive fact-finding or on making pronouncements, but rather on coöperation with existing agencies in the testing out in practice of such theory and research as are already available with respect to problems in teacher education which have been locally identified as important. These problems cover the entire range affecting teachers from the time of entering the profession to retirement. There are two main projects in the program. In the first place, there is the so-called coöperative study of teacher education in which are participating six universities, five liberal arts colleges, two Negro colleges, seven teachers colleges, and fourteen public school systems or groups of school systems. This venture was launched in the fall of 1939 after a preliminary planning conference held on the campus of Bennington College, Vermont. The second project began in March, 1940, and consists of three all-state programs in Georgia, Michigan, and New York, coöperatively financed and administered with existing agencies of statewide competence.

The Commission's characteristic method of work is through the stimulation of local group thinking and the provision of special services. Among the latter, the first to get under way was the division of child development and teacher personnel which, in addition to offering extensive consultant services during the academic year to the coöperating units, was able to conduct during the same period a collaboration center on child development at the University of Chicago. Here intensive training, enriched by col-

lating the contributions of such disciplines as human biology, cultural anthropology, psychology, and pedagogical research, was given to a selected group of post-doctoral educators who, in turn, may be called on for consultant services during the academic year now under way.

The Commission's special evaluation service was launched early in 1940 and a clearing house for information regarding the study and its interests was opened a few months later. Following a called, exploratory conference in April, the Commission decided to undertake a modest inquiry into certain problems related to the education of college teachers and initiated a program to this end in September. Among the numerous ways of working with other institutions, besides those connected with either of the projects herein described, special mention should be made of the third annual Joint Conference on Teacher Education, held this year at St. Louis in February, in which the Commission was associated with thirteen leading educational organizations.

The summer's activities included a five-week workshop on teacher education on the campus of the University of Chicago, and coöperation with the Progressive Education Association in conducting similar workshops at Denver, Des Moines, Greenville, Houston, Los Angeles, and Milwaukee. The Commission similarly worked with The Open Road, Inc., by providing two fellowships for teachers and evaluation service for each of three field seminars, dealing respectively with the great plains and Rocky Mountain area, the Tennessee valley, and sociological conditions of the South.

National Teacher Examinations.—Examining materials for the second annual administration of the National Teacher Examinations are being prepared by the staff of the Cooperative Test Service of the American Council on Education. The dates set by the National Committee on Teacher Examinations for the 1941 testing of teaching candidates are Friday and Saturday, March 14 and 15. The examining fee will be $7.50. Examination centers for 1941 will be announced later.

The National Committee on Teacher Examinations was appointed by the American Council on Education in 1939 at the request of school teachers and administrators throughout the country. Its members were authorized to direct the development of a battery of objective tests suitable for the examination of teaching applicants. The first administration of the National Teacher Examinations was accomplished on March 29 and 30, 1940, in twenty-three centers throughout the United States. Examining was conducted at each center under the direct supervision of an examiner acting by authority of the National Committee. The examination battery consisted of the following tests, with the time indicated in minutes:

Common Examinations (taken by all candidates)	
Reasoning	40
English Comprehension	40
English Expression	40
General Culture	180
(Current Social Problems, History and Social Studies, Literature, Science, Fine Arts, Mathematics)	
Professional Information	120
(1) Education and Social Policy, (2) Child Development and Educational Psychology, (3) Guidance and Individual and Group	

Analysis, (4) Elementary School Methods, or Secondary School Methods.

Contemporary Affairs	60
Optional Examinations (showing mastery of particular subject matter to be taught)	
1. Education in the Elementary School	120
2. English Language and Literature	90
3. Social Studies	90
4. Mathematics	90
5. Biological Sciences	90
6. Physical Sciences	90
7. Spanish	90
8. French	90
9. German	90
10. Latin	90

Following examination of the candidates the test papers were scored through use of the International Test Scoring Machine, results were recorded in a permanent file, and reports were made to the examinees and to superintendents and other administrators to whom candidates had requested that reports be sent. A total of 3,726 candidates were examined. Individual reports of the 1940 National Teacher Examination results were sent to approximately 200 administrators designated to receive them by the candidates. (A more detailed report on the administration of the 1940 examinations will appear in a fall issue of *School and Society*.)

Analyses of the results of the examinations are being made. A report by John C. Flanagan will appear in a forthcoming number of the *Journal of Experimental Education*. In this report data bearing on the validity of various parts of the examinations will be given, as well as information concerning the qualifications of candidates and the intercorrelations of test scores.

The examinations were developed in the belief that useful information regarding *one aspect* of a teacher's qualifications and promise could best be obtained with an objective and comparable scale. Successful teacher selection can be based on no single characteristic or judgment of the individual, but instead involves the pattern of qualifications and traits shown by a candidate as judged in relation to the particular position, the administrative organization, the philosophy of the school system, and community standards. A joint publication of the National Committee on Teacher Examinations and Commission on Teacher Education of the American Council on Education is now being prepared in an effort to provide administrators with practical information about significant factors in teacher selection and the means available for determining the status of applicants with regard to those factors.

The use made of the examination results has appropriately been varied. In the school systems requiring National Teacher Examination records of applicants, selection has been based upon various estimates of personal and social characteristics, recommendations, training, and experience, in addition to the examination results. The weight assigned to the examination results has also varied from one system to another, some allocating as much as one-half of the total rating to the examinations, others as little as one-third. In some instances the examinations have been required only of candidates who had been previously selected on the basis of interviews and ratings. In other cases the examinations have been used as a preliminary qualifying hurdle.

Suggestions dealing with the examinations and services provided are welcomed. It is hoped that the response of persons interested in this project will make possible further improvement in the examinations and permit the establishing of a larger number of examining centers for the convenience of candidates in 1941. This information was forwarded by David G. Ryans, Executive Secretary of the National Committee on Teacher Examinations, 15 Amsterdam Avenue, New York City.

Motion Picture Project.—The Motion Picture Project of the American Council will bring its three-and-a-half-year film evaluation program to a close on June 30, 1941. During the intervening time the findings of the Project will be summarized in a series of publications. These publications will take the form of various numbers in the American Council on Education *Studies*, an encyclopedia of selected 16-mm. films found to be good or better in the evaluation program, and a final report in book form.

Reports from the four major demonstration centers of the Project will be published in the *Studies* series. The report of the Tower Hill center was published in September under the title, *A School Uses Motion Pictures*. Reports from the University of Minnesota and the Denver and the Santa Barbara public school centers will be published within the next several months. In addition to these center reports, the *Studies* series will include: *Films on War and American Policy*, a bulletin on the use of specific films in the social studies compiled by Blake Cochran of the Project staff; and *Projecting Motion Pictures in the Classroom*, a bulletin on problems of motion picture administration prepared by Francis W. Noel of the Santa Barbara schools. Both of these latter *Studies* will be published in October, 1940.

The Tower Hill report emphasizes the ways in which films contribute to educational objectives in the subject matter areas throughout the elementary and secondary grades. The Santa Barbara study will describe the uses of films in the core curriculum throughout the twelve grades. The Minnesota report will summarize several controlled research studies on the use of films in the General College. The Denver material will be presented in the form of a manual on the production of films dealing with community activities by high school teachers and pupils.

The encyclopedia of films will consist of a summary of the results of the entire evaluation program of the Project in relation to individual films. Of approximately 1,500 films evaluated during the past three years, some 500 will be included in this encyclopedia. The source, length, and content of each film will be described in detail; the range of grade level usefulness will be indicated; objectives which the film serves will be stated; the degree of value in relation to educational objectives will be specified; the strong and weak points of the film in these relations will be pointed out; and significant pupil behavior will be described. Films will be arranged alphabetically and indexed by content and objectives served. The index will be alphabetical, since the point to be emphasized in the encyclopedia is the relation of films to educational objectives and curriculum areas, rather than to school subjects as such. Data summarized in the encyclopedia will be drawn from over 7,500 teacher reports

and from over 10,000 pupil reports on approximately 1,500 films used in schools in various parts of the country.

In the final report the findings of the entire staff of the Project will be summarized in relation to the functions of motion pictures, the kinds of films available, the objectives they serve, the conditions of their use, and the types of pupil reaction to films in the curriculum. The major emphasis will be on the need for intelligent discrimination in the selection and use of films, the development of an understanding of the functions of this new medium in education, and the problems which have been opened up for experimental investigation.

The Motion Picture Project has been conducted as an activity of the Committee on Motion Pictures in Education of the American Council on Education, with Ben G. Graham as chairman and under the direction of Charles F. Hoban, Jr., the latter of whom compiled this progress report.

Government and Educational Finance.—The Committee on Government and Educational Finance of the American Council on Education, of which John K. Norton, Teachers College, Columbia University is Chairman, is primarily concerned with research bearing upon the improvement of the methods of financial support of American education. It is especially interested in the relations between agencies of educational administration and of other areas of government, and of the relations of governments at different levels (local, state, and national) to the problem of financing education.

This Committee was appointed by the Chairman of the Council in 1934 for the original purpose of studying the needs of education growing out of the crisis caused by the depression. Its first study showed the effect of the depression on the financial support of education and revealed the need for federal emergency aid for education in certain states.

Subsequent studies have shown the relative ability and effort of the various states to finance education at given levels. The first of these which was given some assistance by the Committee was entitled *The Economic Ability of the States to Finance Public Schools* by Leslie L. Chisholm. It estimated the actual tax revenue which each state could raise, employing a modern and effectively administered system of taxation. The findings of this investigation indicated that a number of states lack the tax resources to finance an educational program of average cost. A second study growing out of the one just cited above, *The Efforts of the States to Support Education* by Lyle W. Ashby, established the fact that, in general, the states maintaining schools on a substandard financial level are making a greater effort than those which finance education on a superior level. A third inquiry, *Wealth, Children and Education* by John K. and Margaret A. Norton, demonstrated beyond a doubt that gross inequalities in financial provision for the support of education in different states grow out of fundamental differences in the economic resources and taxpaying capacity of these states.

The Committee during the past year has been directing its attention to the problems of financial support of higher institutions. Present indications are that an increasing number and proportion of high school graduates will seek some form of post-secondary education and, if they are to be provided with adequate educational opportunities, it is highly

important to develop more effective methods of support. In connection with this study two conferences attended by a number of college and university presidents were held. The first considered means of securing increased private support for higher institutions, while the second dealt primarily with the problems of tax-supported colleges and universities.

With the encouragement of the Committee, J. Harold Goldthorpe of the Council staff has been studying problems of philanthropic support of higher education. His investigation is based upon data from the United States Office of Education and the Bureau of Internal Revenue of the Treasury Department, and has produced valuable material concerning philanthropic contributions under the federal estate, gift, and income taxes for the period since 1920. It is hoped that the final study may be completed soon and issued as a Council bulletin.

The Committee has also made plans to study the controls, the legal structure, operating conditions, practices, and the educational and financial effects of the various state-local relationships in the financing of public education. Under the pressure of depression and emergency conditions of recent years many of these relationships have been drastically modified and revised. These have now been in operation sufficiently long so that their actual results in terms of financial controls and educational influences need to be appraised.

The work of this Committee has been handicapped by the fact that funds available for its work have been extremely limited, although the officers of the Council have been generous in providing some resources from the general funds of the Council.

It would be especially desirable if the Committee now had funds to study the whole matter of the special problems of financing education in a period of national crisis of the type which we are just now entering.

This statement was prepared by John K. Norton, Chairman, Committee on Government and Educational Finance.

Committee on Student Personnel Work.—This committee of the American Council on Education has already issued two brochures entitled "Educational Counseling of College Students" and "Occupational Orientation of College Students". A brochure on "Social Competence and College Students" has been approved for publication. The first draft of a booklet on financial aid to students has been examined and is now being rewritten. A volume on the interpretation of student problems is under preparation by Dean and Mrs. Herbert E. Hawkes. The Committee has approved two subcommittees, one to prepare a brochure on the administration and coordination of a student personnel program, and one to explore the possibilities of a brochure on problems of moral and spiritual education in colleges and universities. Finally, the Committee has approved the appointment of a sub-committee to prepare a booklet on student placement as soon as funds are available following the completion of the publications whose preparation is already either under way or has been previously approved for preparation. The chairman of the Committee is R. A. Kent of the University of Louisville.

Committee on Professional Education.—The Sub-Committee on Professional Education of the Problems and Plans Committee, American Council on Education, has provisionally set itself the

task of determining areas of overlapping interests in dental, engineering, legal, and medical education. It is hoped that through such a study a better understanding of education for the professions in present day America may be developed and, furthermore, that the various branches of professional education may each derive support from a better insight into the procedures developed in the educational preparation for the other professions. Incidentally, the relation between general and professional education has been made a subject of concern for the Sub-Committee's activities.

The techniques thus far used in the exploratory phases of the Sub-Committee's activities are largely three: conferences between the members of the Sub-Committee itself; a survey of the four fields, conducted by the four members of the Sub-Committee and resulting in comprehensive reports, one for each of the professions; and eliciting of professional opinion from selected representatives of the four fields.

The tentative results achieved by these procedures may be briefly summarized by saying that six immediate, urgent problems have emerged from the Sub-Committee's studies:

1. The need for a comprehensive formulation of objectives in professional education, with special reference to broad culture as a basis for scientific and technological knowledge and for the social responsibilities borne by the professions.

2. The place of the professional school as a unit in the university, with particular reference not only to the general purposes of education but also to certain administrative phases.

3. The desirability of a better understanding of the objectives and methods of continuing education, that is, the education of the practitioners of the profession, the education of specialists, the relation between graduate and undergraduate curriculums in the professional schools, and the methods of administrative control of the professional schools within the university in their activities in the field of graduate education.

4. The immediate importance of developing a valid and comprehensive concept of professional ethics, with the special purpose of so molding the educational processes in the professional school that ethical adequacy and professional idealism may be safeguarded.

5. The delimitation of the place of the official and of the voluntary licensing and accrediting agencies in their exercise of social control of the professions and of professional education.

6. The adaptation of professional activity and professional education to the changing needs in social welfare.

It is recognized that of these six problems each presents an intense challenge to educators in the various professions. The Sub-Committee realizes that these six problems do not exhaust the issues to which it may devote its studies. It recognizes, furthermore, that such problems are in no sense self-limited, but that there are over-lapping considerations in all of them. Nevertheless, it will attempt to undertake these studies seriatim, emphasizing continuously the comparative viewpoint, in order that duplication of any work already conducted or in process in any of the professional groups themselves may be avoided. It is likely that the Sub-Committee may decide to devote its immediate attention to the

clarification of the purposes of professional education. The chairman is Alphonse M. Schwitalla of St. Louis University School of Medicine, who prepared this statement.

Junior College Terminal Education.—The Commission on Junior College Terminal Education is approaching the close of the year of exploratory study for which it was organized by the American Association of Junior Colleges under a grant from the General Education Board. Walter Crosby Eells, executive secretary of the association, is director of the study, and Edward F. Mason is director of publication.

Twenty regional conferences, supplementing four held in May, are designed to reach almost all of the 575 junior colleges in the country. These conferences are designed to interpret the need for terminal education, to secure judgments on outstanding problems, to explain procedures appropriate to a continuation of the study, and to discuss the desirability of further institutional cooperation. Dr. Eells speaks at each conference, with the general meeting being followed by a round table for administrators and by another for students.

Outstanding problems revealed in the May conferences were: How to develop terminal curriculums which will better fit the needs of the community and its students? How to secure more adequate state financial aid for terminal programs? How can a small junior college support a suitable range of terminal curriculums? Thirty-five other significant problems have been identified, and 325 institutions have indicated an interest in studying one or more of them.

An extensive annotated bibliography, comprising more than 1400 entries, *The Literature of Junior College Terminal Education,* has been compiled and is in press. Material has been collected for two other monographs, *The Status of Junior College Terminal Education* and *Why Junior College Terminal Education?*

Among 426 junior colleges, 293 were found to be offering terminal curriculums. More of these were in business education than in any other field, but there was a wide variety of other offerings, ranging from aviation and cosmetology to mortuary science and recreational leadership.

Research in Science.—The Bureau of Educational Research in Science at Columbia University, aided by the General Education Board, has been engaged in helping teachers to achieve a working understanding of the ways in which scientific discoveries are affecting contemporary life. At the same time, it has been assisting teachers to select and organize materials and methods to serve the functional needs of young people. It has been possible to enlist the assistance of scientific authorities to help interpret some of the major problems and to report these interpretations in a manner suitable for use by teachers interested in advancing the general education of their students. These reports are being published by the Bureau of Publications, Teachers College, under the series title, "Science in Modern Living."

Opportunities have been offered to interested teachers to study in the areas of these contemporary problems. The methods of study give a mature consideration of the problems and are not limited by pedagogical questions about methods of teaching. The teachers are acquiring ability to comprehend the things going on in personal, community, and national

life, and a feeling of competence to contribute to them. Such assurance stimulates the teacher to make his work a vital force in the community.

Growing out of these experiences with personal and community problems are the *Suggestions for Teaching*, included in the "Science in Modern Living" Series.

A recent grant from the General Education Board extends the work of the Bureau for three years beginning September 1, 1940. In this interval the Bureau will be in constant cooperation with public schools. Arrangements for this cooperation have already been made.

The summer curriculum workshop is one of the important agencies for advancing the studies under way in the Bureau. Teachers in the cooperating schools assemble during the summer to work together on common problems. Consultants who are specialists in various areas, such as phases of community study, technology, growth and development, and philosophy of science, are employed to assist the teachers. All members of the Bureau work together in preparing suggestions for teaching. Members of the resident staff make their contributions as specialists in curriculum and in evaluation, and will assume leadership in coordinating the activities of the cooperating schools and in reporting the results of the experimental work.

During the academic year, resident members of the Bureau will visit in the cooperating schools and carry reports of work from one to another. The work reported may be studies of communities and of children as a basis for teaching objectives. It may be on teaching approaches, activities through which children explore and study a problem area, and on methods and results in evaluation, all related to objectives. As circumstances arise in which it would be helpful for certain of the cooperating teachers to confer and study together, arrangements may be made for such meeting.

In reviewing the opportunities and the responsibilities of the Bureau of Educational Research in Science, we are reminded that science teachers at all times, and especially now when surrounded by war and faced with the problems of defense, have two major functions to perform. First, as professional workers, it is their task to guide the growth and development of American children, and to prepare them to live in a world that is more and more dominated by the methods of science. Second, as individuals with specialized training in science, they may contribute to national welfare by participation in constructive community activities.

At the present time it would seem, whether or not this country will ever need to fight a defensive war, that great changes will inevitably take place, both in our own social and economic organization and in that of the world at large. The mere establishment of administrative machinery for the engineering of defense may form a basis for the reorganization of our society later in a time of peace. Teachers must consider the ways in which the machinery established for war could be used for peacetime purposes. In so doing, we not only meet the present emergency, but also capitalize on the experiences through which we must pass while in an emergency period.

This statement was prepared by S. R. Powers, administrative officer of the Bureau.

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